Special New York Show Issue

MOTOR AGE

Vol. XXXIII
No. 1

CHICAGO, JANUARY 3, 1918

Price 25 Cents

Keep Your Car Young with

JOHNSON'S AUTO PRODUCTS

SEE PAGES 129, 130, 131, 132, 133, 134

Johnson's Carbon Remover
Cures 80% of engine trouble. Harmless, efficient and easy—five minutes' time and no labor required.

Johnson's Cleaner
Removes spots, stains, etc. Puts the finish in perfect condition for the polish.

Johnson's Prepared Wax
Liquid and Paste
Polishes—preserves and protects the finish of the Body, Hood and the Fenders.

AUTOMOBILE owners will find that they can Keep their Cars Young and reduce depreciation with Johnson's Automobile Products. Every one is guaranteed to give satisfaction. Write for our booklet entitled "Keep Your Car Young." It's free.

DEALERS

In planning your stock for Spring be sure to figure on a good supply of Johnson's Auto Products. They have all been tried and every one is bound to give satisfaction. They are backed by a half-million dollar advertising campaign. They net the dealer a nice margin of profit and they are all fast sellers.

S. C. JOHNSON & SON
Dept. M.A. Racine, Wis.

Johnson's Black-Lac
For dusty, grimy, faded tops, side curtains, cushions, etc. Dries in fifteen minutes.

Johnson's Auto-Lak
A body varnish which amateurs can use successfully. Dries in twenty-four hours.

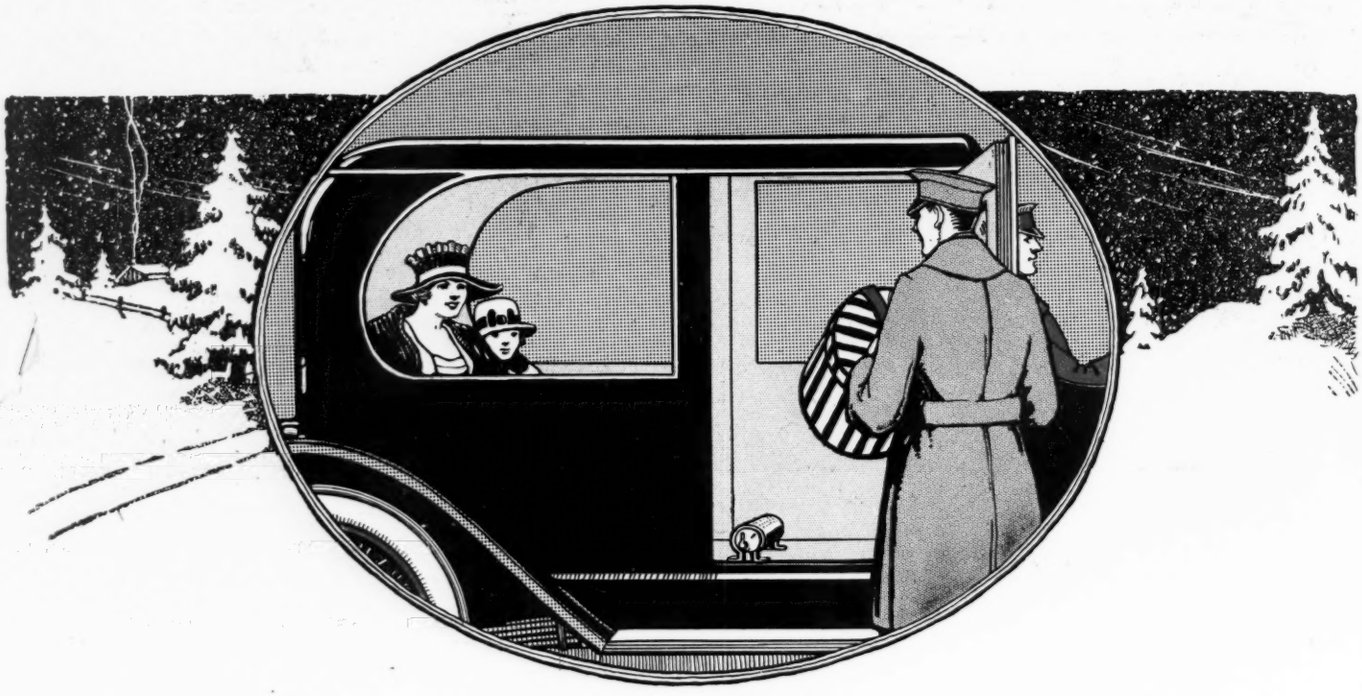
Johnson's Stop-Squeek Oil
Lubricates the springs. Removes squeaks from all parts of a car.

Johnson's Freeze-Proof
Prevents frozen radiators. One application last all winter. Absolutely harmless.

Johnson's Radiator Cement
Mends leaky radiators. Easy to use and it does the work.

Editorial Contents—Page 3

Advertisers' Index—Next to Last Page



UTILITY
Protected Foot Rail HEATER

—insures perfect driving comfort, even in the coldest weather, *by tempering the atmosphere of your car to any desired degree.* It keeps you warm all over, as though you were in a carefully heated house.

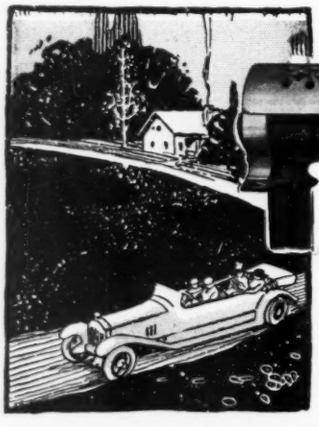
And remember that, although it is possible to install UTILITY Protected Foot Rail Heaters in any part of your car, it is most desirable to substitute them for the foot rail. This installation is in accordance with recommendations of physicians who find that heat delivered directly against any part of the body—except the feet—or breathed straight into the lungs, is extremely injurious to health, and breeds dangerous colds.

UTILITY Protected Heater—installed in place of the foot rail—is the one dealers recommend, owners demand, jobbers catalog and manufacturers you will know, install as standard equipment.

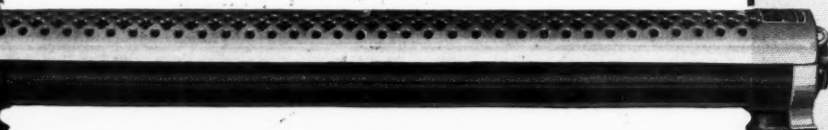
Write for free illustrated literature and complete details

THE HILL PUMP VALVE COMPANY

ARCHER AVE. AND CANAL ST. . . . .CHICAGO
Eastern Sales Office: 149 Church Street, N. Y. City
Manufacturers of Famous UTILITY Auto Specialties



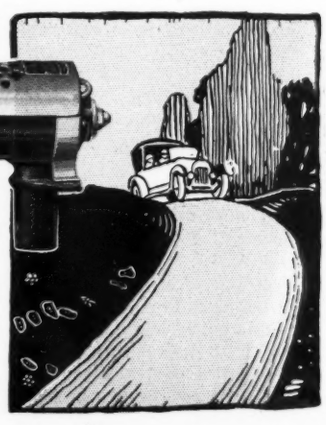
Heater core gets hot enough to burn or it would not heat your car.



PRICES

UTILITY Protected Heater	$15
West of the Rockies	$16
UTILITY Front Seat Heater, for Maxwells, Chevrolets, Fords and Front Seat Installations in all other cars	$10
West of the Rockies	$10.75
UTILITY Jr. Protected Heater for Fords	$7.50
West of the Rockies	$8.00

Protector shield stays cool enough to touch so it cannot burn shoes or robes.



Watch for the Gold Plated Utility Protected Heater on Anderson Six at the Shows

MOTOR AGE

Published Every Thursday by the
CLASS JOURNAL COMPANY
Mallers Building
CHICAGO ILLINOIS

Entered as Second-Class Matter September 19, 1899, at the Postoffice at Chicago, Illinois, Under Act of March 3, 1879—Member of the Audit Bureau of Circulations—Copyright, 1917, by the Class Journal Co.

United States, Mexico and U. S. Possessions One Year $3.00
Canada .....One Year $5.00
All Other Countries in Postal Union.....One Year $6.00

BEWARE OF SUBSCRIPTION SOLICITORS OFFERING PREMIUMS OR CUT RATES—ALL CURRENCY SHOULD BE SENT BY REGISTERED MAIL.

RENEWALS or CHANGES OF ADDRESS should be sent two weeks in advance of date they are to go into effect. Be sure to send old as well as new address to avoid unnecessary delay. RECEIPT of first copy is acknowledgment of subscription.

Vol. XXXIII Chicago, January 3, 1918 No. 1

Contents

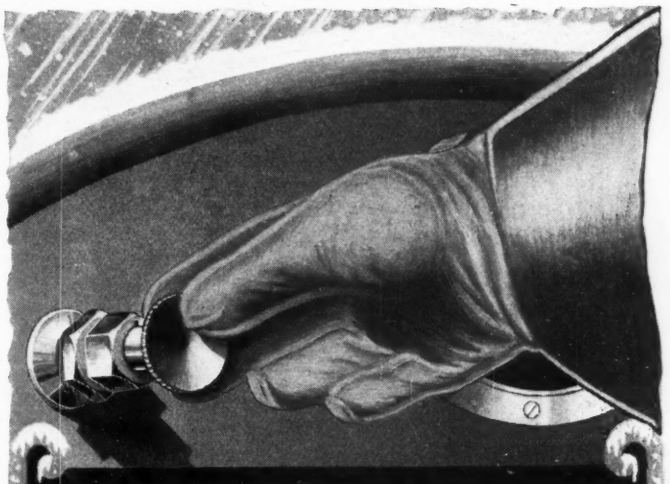
WAR DECELERATES PASSENGER CAR DESIGN 5
DEVELOPMENTS AT CAPITAL..... 10
EDITORIAL—THE 1918 SPIRIT—OUR FIRST WAR MODELS—ENGINEERING OF INDUSTRY..... 14
WAR'S EFFECT ON INDUSTRY..... 16
THE TRUTH ABOUT PRICES AND MATERIALS.. 18
THE FOUR WINDS OF TREND DESIGN..... 20
AVERAGE CAR OF 1918..... 28
ELECTRICAL EQUIPMENT OF THE MOTOR CAR 30
MADE IN AMERICA CARS..... 33
HARMONY IN THE CAR INTERIOR..... 62
BUYER'S GUIDE TO CAR BODY STYLES..... 63
SPECIFICATIONS OF THE 1918 PASSENGER CARS 72
THE CARS IN BRIEF..... 80
1918 Models and Their Improvements.
NEW STUDEBAKER DESCRIBED AND ILLUSTRATED 103

DEPARTMENTS

MOTOR CAR REPAIR SHOP..... 97
READERS' CLEARING HOUSE..... 98
ACCESSORY CORNER 104
AMONG THE MAKERS AND DEALERS.....105
FROM THE FOUR WINDS.....106

NEXT WEEK

MOTOR AGE of next week will contain a complete report on the New York show, which will include a more specific account of the cars on exhibition in the Grand Central Palace.



a snap

TO START YOUR MOTOR IN COLD WEATHER

when equipped with the

LUNKENHEIMER PRIMER

No need to waste the starter battery spinning the motor, trying to raise and vaporize the gasoline from the cold carburetor.

A stroke or two of the Lunkenheimer Primer Plunger will inject a charge of atomized gasoline **directly into the intake ports,** —giving a power impulse on the first turn.

Being mounted in the cowl within easy reach, it is convenient to operate. Besides, it saves time, and makes priming a safe operation, as the gasoline is not exposed to the atmosphere.

The **LUNKENHEIMER PRIMER** is easily attached to any make of car and all necessary connections are furnished.

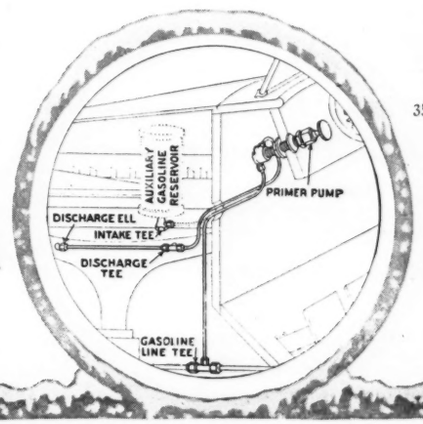
Details for attaching and operating are given in our Booklet No. 513—C.H. Write for a copy, mentioning make of car.

For a quick start—*prime your motor,* don't choke it.

THE LUNKENHEIMER CO.
"QUALITY"

Largest Manufacturers of
High Grade Engineering Specialties
in the World

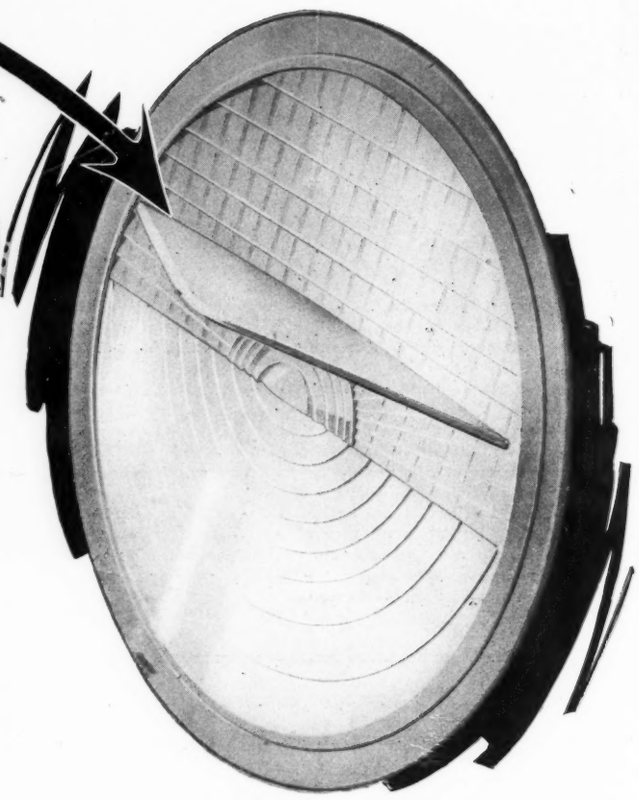
New York Chicago CINCINNATI Boston London



35-15-38

360187

The Fin That Put The Finish to Glare!



The minute a motorist lays eyes on the Holophane Lens he must realize that it is radically better than *any* other he has ever seen. For in this lens he finds something more than *theory*—something tangible—something he can see and feel: the Holophane Fin, which puts a positive shield between the lamp in which it is used and the eye of the approaching motorist, making possible for the first time really *glareless, bright* illumination of the road.

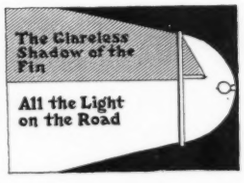
Dealers: Holophane Lenses not only sell themselves, but they actually *create* business for you by enabling you to displace many of the hundreds of thousands of unsatisfactory lenses which motorists have bought.

Your customers rely on you to offer them the best. Don't injure your prestige by letting them see this obviously better lens on other cars only to realize that they had no chance to buy it in *your* store. Write today for our complete proposition and trial order offer.

Size of Lens	Per Pair—U.S.	Canada
7 to 8¾"	$2.75	$3.30
8⅞ to 9⅝"	3.50	4.20
9¾ to 10¼"	4.00	4.80

West of Mississippi add 25c per pair

Every Motorist Must See At A Glance That This Lens Is Better



How the Holophane Fin Acts

A Holophane Glass Company, 343 Madison Ave., New York .....

Send me information about your dealer proposition and trial order offer.

Name .....

Address .....

HOLOPHANE

THE LENS WITH THE FIN

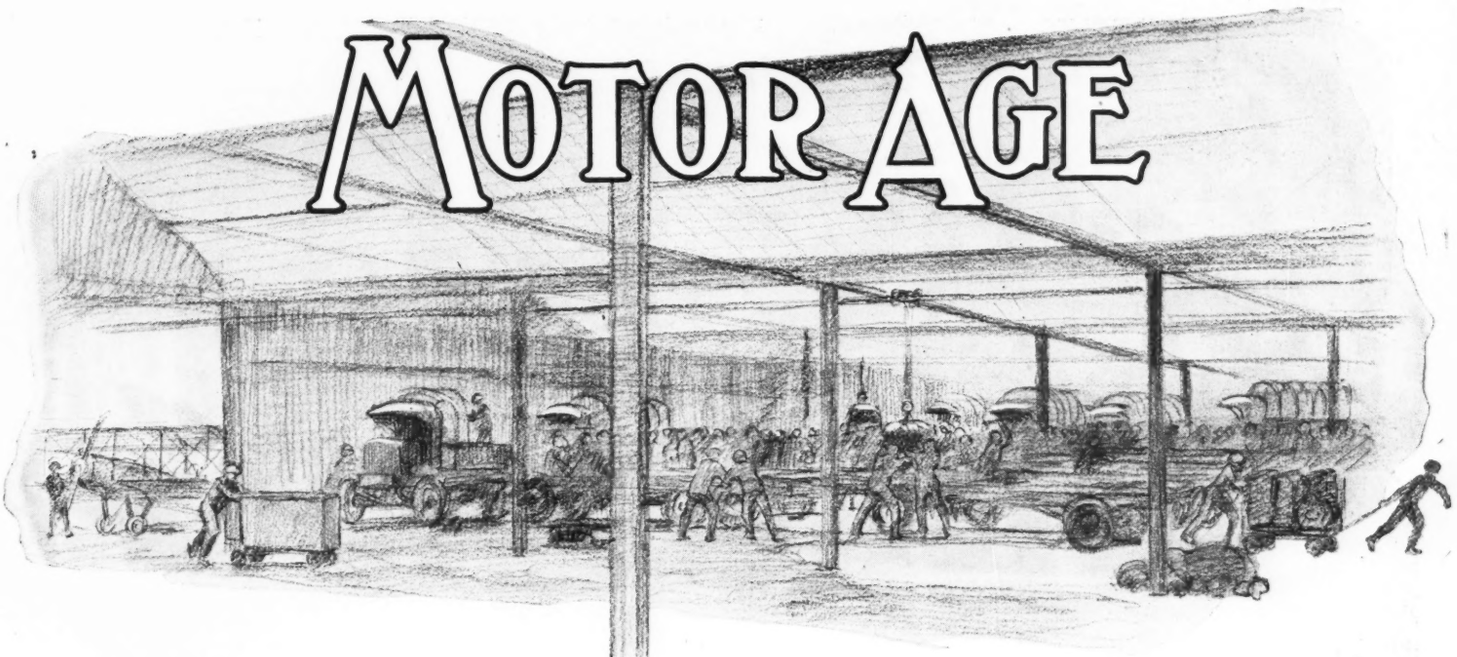
HOLOPHANE GLASS CO.
343 Madison Avenue, New York

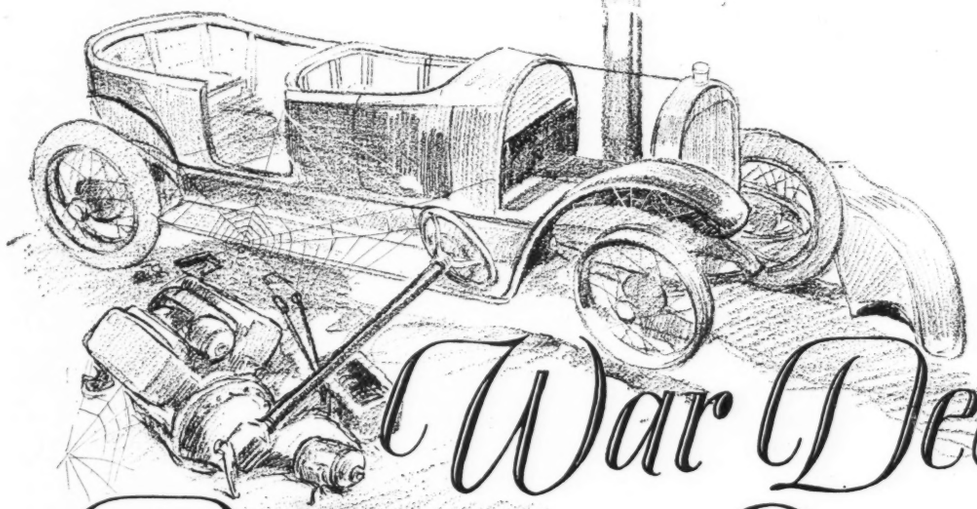
LOOK FOR HOLOPHANE AT THE New York Show SPACE 228 4th FLOOR

When Writing to Advertisers, Please Mention Motor Age

Vol. XXXIII, No. 1 Chicago, January 3, 1918 $3.00 Per Year

MOTOR AGE





War Decelerates Passenger Car Design

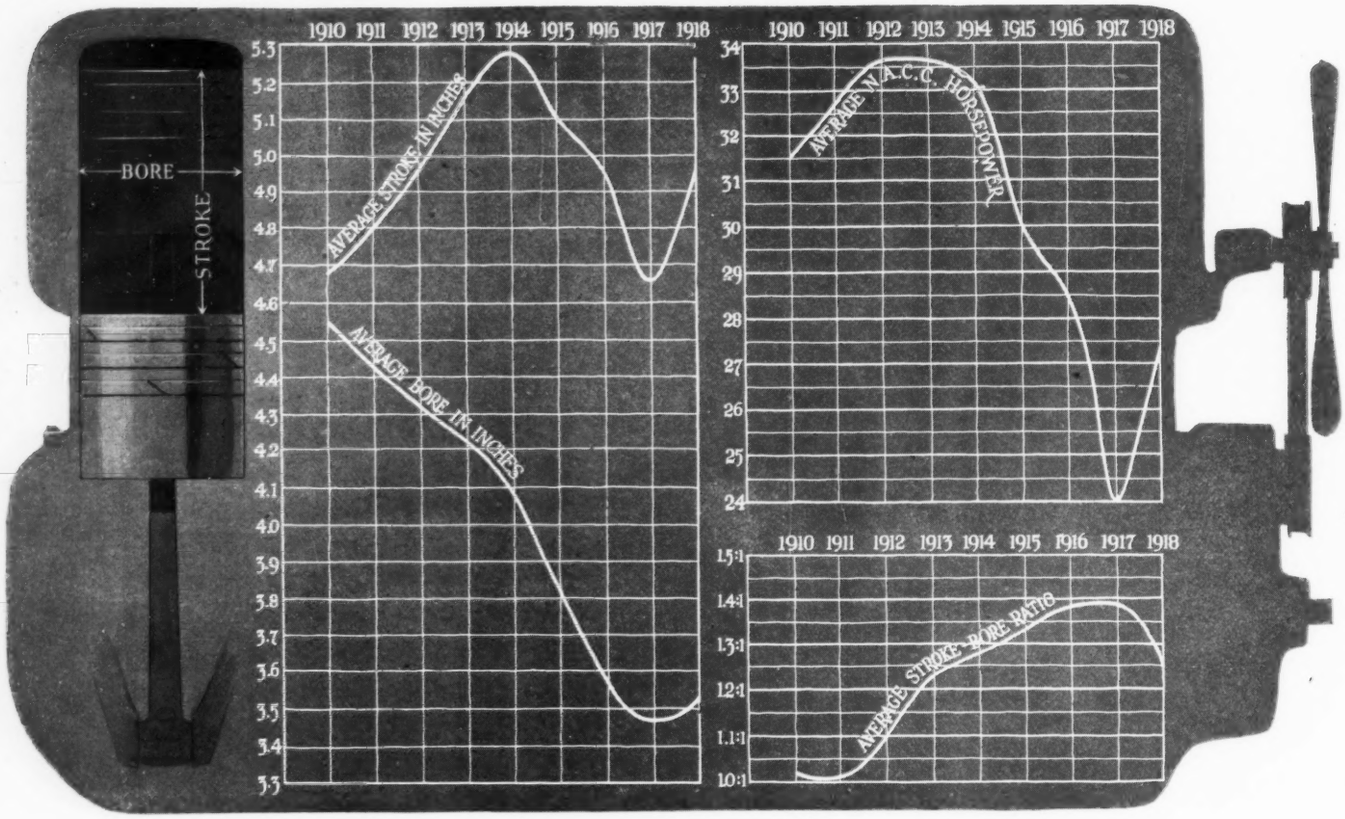
Efficiency Progress as Dictated by War Necessities

By Darwin S. Hatch
Editor Motor Age

IN common with every other phase of American life, motor vehicles have been deeply affected by America's participation in the European war. Extraordinary conditions, such as those brought about by a world war, tend either very greatly to stimulate development of an industry, or to exert a depressing effect upon its development. Both of these effects have been felt in the motor industry. While commercial vehicle and aviation development have been vastly speeded up, passenger car development during the last year has distinctly slowed down.

That such an effect would be produced under the conditions is not surprising, with the best intellect of the industry exerting all its energies, and properly so, toward the more immediate necessities for improvement and production of trucks, airplanes and other direct munitions of war. Also, it must not be overlooked that the uncertainty from the manufacturing and sales standpoints of the industry, together with the imposition of special taxes and fears of difficulties in securing proper materials and transportation facilities as well as the timidity of capital in the time of war, all have made motor car manufacturers withhold new designs which under more auspicious circumstances would have been incorporated in their new series.

To bring out radically new designs involving serious changes in the material, size or arrangement of the units of a car would mean the development of special tools, the partial re-equipment of the factory, and even re-education to some extent of the workmen. With the parts market as it is at present, and the material situa-



Some features of the average motor car engine design tendencies over a period of nine years. These charts are compiled by averaging cylinder dimensions, horsepower, etc., of all chassis models each year. Note that the average bore and stroke, which have been steadily growing less, this year have increased so that the curves take an upward turn. Since the bore was increased, the N.A.C.C. horsepower also takes an upward slant instead of its former downward direction. Since the stroke has not increased as much as the bore, the ratio of stroke to bore continues its decrease

tion in its somewhat unsettled state, to incorporate radical changes would in many instances endanger a proper and continuous supply.

With the nation calling for every man, and particularly every skilled man that the motor industry can supply, manufacturers are doing a patriotic thing, in not making extensive alterations in their products for the new year. Those few who have greatly altered their cars for 1918 are in a position to do so with little or no loss in efficiency of production, or danger from inadequate supply of material for parts.

On the whole, changes in design of the 1918 cars, as compared with those of 1917, are fewer and slighter in extent than has been the case in any previous year. There are a few notable exceptions to this statement. Hupmobile has been redesigned almost throughout; Studebaker has been changed very materially, and most strikingly in its exteriors. Case is a new car throughout. One other large concern whose plans may not be divulged at this moment, is preparing for sweeping changes in design. Cole has striking new bodies.

Most of the cars are altered in some slight degree, as compared with last year's model, but in few instances have these alterations been anything other than refinements, and as in the case of those mentioned above, none which would entail very material changes in manufacturing processes. Much of the development this year has been along body lines, a department in which changes can be made without upsetting manufacturing processes.

The result of America's passenger car development during the year 1917 will be placed on display Saturday at the Grand Central Palace, New York, at the annual exhibition of motor cars for 1918. There will be found many examples of the beautification of bodies, there will be found many examples of important modifications of the carburetion system to handle present day fuel in a better way, and there will be found many instances of small refinements looking to easier maintenance on the part of the owner.

To Pay More

With it all, the prospective purchaser will find that he will have to pay appreciably more for his car than he has had to pay in previous years. Costs of materials and labor, a certain slackening in production, have required a higher figure on the 1918 cars than that of 1917, which in its turn was somewhat increased over that of the preceding year. This increase in the price of cars is taken up more in detail on other pages, and it is a factor which probably will have considerable effect upon motoring during 1918. There is, however, a gleam of brightness to be discerned in the gloom of the situation in the probability that through the increase in the cost of parts and labor there have been, and are being developed, methods of economy in motor car production which should make possible a very considerable decrease in car prices, when conditions resume their normal state.

Last year when the increased price was considered, it was pointed out that the 1917 cars were more dependable and better cars than they had been previously, and that the motor buyer was getting his money's worth in spite of the higher price. This year, cars as a whole are better and more reliable, and it is equally certain that the motor buyer will get his money's worth even at the higher price, but it must be admitted that the price increases were inevitable whether or not they were accompanied by a corresponding increase in service.

Motorists and prospective motorists of 1918 are offered in the succeeding pages of this issue complete specifications and illustrations of the motor cars manufactured by the American builders. These include the products of 125 American motor car builders who are offering 180 different chassis upon which there are fitted 656 different bodies.

Each year the complexion of MOTOR AGE'S annual specification number changes

slightly on account of additions to and subtractions from the members of the industry. This year the reader will find in the roster of car names a number which have not appeared before. Also, this year, at least, there will be a somewhat greater number for which he may search in vain.

Among the new name plates to appear in the ranks of the 1918 passenger cars are the Comet, Peering-Magnetic, Geronimo, Ghent, Nelson, Olympian, Pennsy, Sayers, Shadwyck and States. In addition to this list there is one other new name, the Campbell, which started originally as Emerson.

Among those whose names are not included in the rolls for 1918, either because the manufacturers have definitely discontinued production, or because their plans are not sufficiently crystalized to be incorporated with the cars of 1918 at this time are the following: Aaland, Ams Sterling, Charter Oak, Detroiter, Drexel, Drummond, Enger, Geneva, Hatfield, Howard, Richmond, Ross, Sun.

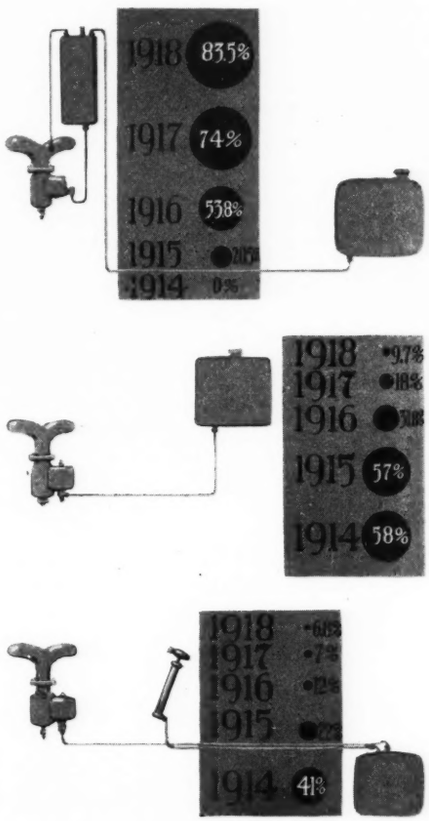
Wartime conservation has influenced motor car buyers to demand of motor car builders a decrease in the fuel consumption of their cars. Means for meeting this requirement and at the same time improving the operation of the car, particularly when cold, constitute what is probably the chief engineering development of the year.

Carburetion of Fuel

Proper carburetion of the fuel has been an increasingly difficult problem from year to year with the gradual raising of boiling points, and increase in variation of its constituent elements. To vaporize and carburete properly the gasoline of today requires a great deal more than was required a few years ago.

This year's progress along that line has taken the form of the development of special manifolds and special carbureters, into both of which a greatly increased quantity of heat may be maintained. This has taken the form of hot spots in the manifold and electrical heaters, by which the fuel in the carbureter may be raised in temperature to a point where it can be properly mixed with air and taken into the cylinders. These features are gone into in detail in other pages, and need only be mentioned here. Other developments that have accomplished the same result include methods of heating the intake air, etc.

Engineering development also is noticeable in the improvement in balance of the crankshaft, a feature which in the last year or so has been rather prominently in the public eye. Along with this there has been a rather general reduction of weight of the reciprocating parts, such as the pistons, connecting rods, and the valve gear, and also some work towards giving more flexible engine mounting. All of these things result in decreased vibration of the motor, and consequently longer life and greater economy. Along with other purely engine improvements may be mentioned an increased use of detachable cylinder heads, a feature which primarily is dictated by manufacturing considerations, but incidentally is a factor which makes for easier maintenance on the part of the owner, inasmuch as it gives him access to the cylinder for valve grinding, carbon-removing, etc.



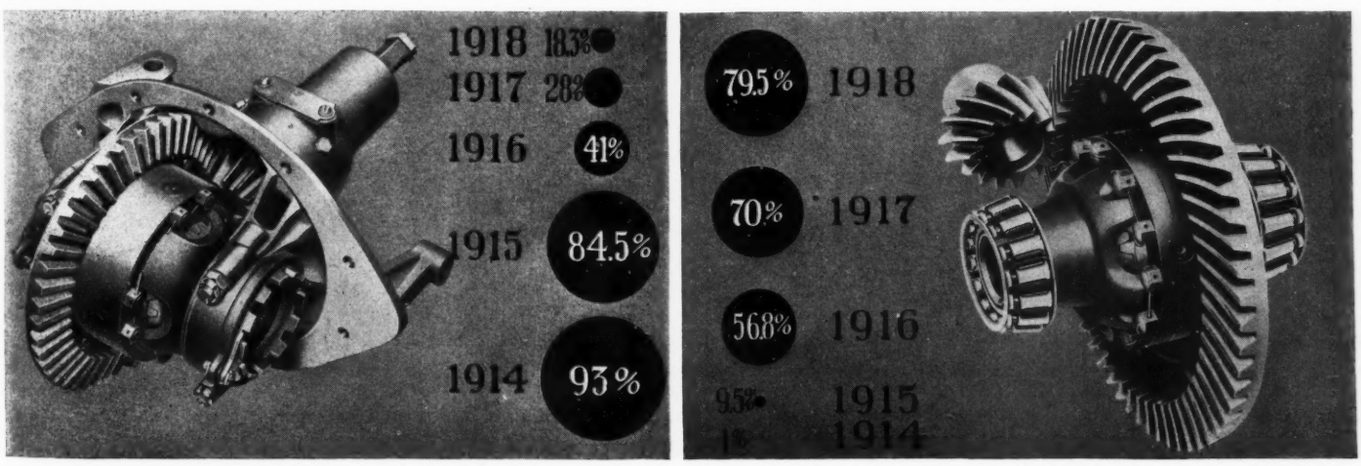
Five years of change in methods of fuel feed. Note the dwindling of the pressure and gravity systems and the rapid increase in the vacuum system as indicated by the proportions of chassis models so equipped

This feature of ease of maintenance on the part of the owner driver, in particular, is one which has been the subject of considerable study this year as in the past, on the part of the designer. Their efforts have resulted in improving along a line which is particularly fortunate in that it is one which has been somewhat generally neglected in the past. This is the easier lubrication of those chassis parts which in the car of previous years have either been overlooked completely by the motorist, or have been the source of dirty and undignified scrambling underneath the chassis.

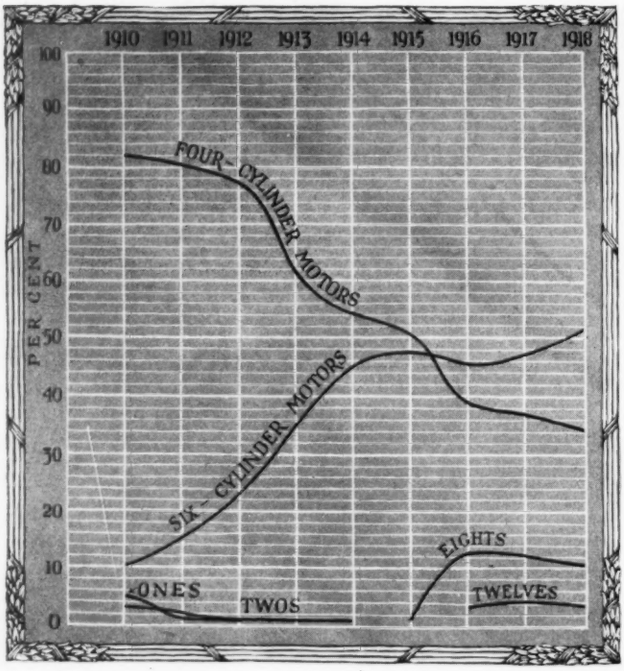
Motorist Considered More

This year one is happy to report that there is considerable evidence of a consideration of the motorist's feelings on this point. Self-lubricated bushings, heretofore chiefly within the reach only of the man who could hire a chauffeur to do the greasing up, now are to be obtained on cars which are more directly within the province of the owner-driver, to whom they would most appeal. In some instances also, oil cups have been substituted for grease cups in spring bolts, etc., so that spring lubrication may not be quite as greasy a job as it has been previously.

Cooling systems have not undergone any general change, but there are one or two instances of unusual design. The thermal control of the water-circulation so that the engine cooling could be regulated automatically is not entirely new, but its use has been extended somewhat during the last season, and one concern has extended this idea to control the intake air as well.



Growth of the spiral-bevel final drive at the right and the diminishing of the straight tooth bevel drive at the left over a period of five years as shown by the size of the circles based upon the percentage of chassis models of which these are features



Plotting the progress of the cylinders. How the proportion of engines of each number of cylinders has changed during the last nine years as indicated by the percentage of chassis models of fours, sixes, etc., each year. Note that the proportion of chassis models with six-cylinder engines has increased each year, and is still on the upgrade, while the proportion of fours has decreased from year to year. These percentages are based on chassis models and not on cars actually produced. Were the latter the case, the fours would lead

Semi-elliptic springs still indicate the same tendency to increase in popularity as rear suspension, at least, among the manufacturers, as they did last year. Along with this the Hotchkiss type of drive naturally has shown similar broadening of its sphere.

The numerous advantages, particularly from the standpoint of the passenger, of hanging the fuel tank at the rear rather than installing it under the seat, or in the cowl have resulted in a very noticeable increase in the use of the vacuum fuel feed. Gravity feed got its vogue of a few years ago chiefly through the difficulties attendant upon a pressure system. With the vacuum system removing these difficulties and permitting the rear tank advantage, it is logical to expect its increased use.

More Comfort Within

This question of the comfort of the passengers has been the cause of a great deal of the exterior refinement of the new cars. To say that seat cushions and seat backs are more comfortable does not mean nearly as much on paper as it does on a three-day tour, nor is that a feature which can be very strikingly displayed. Nevertheless, it is a fact that though upholstery materials may not be genuine leather, to the extent that they were five years ago, the stuff within them makes for the comfort of the driver and passengers, to a greater extent than has been the case previously.

From the standpoint of comfort also, the spare seats once an eye-sore and a knee-sore in a car are being stowed away so that they are less obtrusive when not needed, and at the same time are being made more reliable and seaworthy as accommodation for extra passengers.

Incidentally, the driver has been consulted somewhat as to his comforts, particularly in giving an individual tilt to the driver's seat, which is necessitated by the fact that he has to use feet and hands in the control of the car, and his position, therefore, is somewhat restricted. Also better adjustment of brake and clutch pedals, etc., are provided.

Likewise, comfort of all concerned, and particularly the peace of mind of the owner have been consulted in the development of certain arrangements for the new season. Most important of these is the rather general adoption of that type of curtain which is supported at the doors by rods, so that the curtain opens with the door, and does away with the uncomfortable and undignified necessity of crawling through a partly-opened button curtain if the latter is not entirely open.

The curtains also show improvement in the way in which they have been stowed away when not wanted. In several of the new cars a compartment has been provided within the top so that they can be slipped through a trap door into a space between the outer cover and lining of the top.

Externally the cars of 1918 are distinctively new cars. By that is meant that manufacturers who have made any changes of importance in nearly every case, have shown a redesigned body, and one whose lines differ noticeably from those of previous years. Other manufacturers whose alterations for the new season have been confined to bodies, likewise have distinctive shapes.

The 1918 body in general so far as may be judged from a study of something over 200, and giving due weight to those in which a sweeping change has been made, may be described somewhat as follows:

Its chief characteristic is a pronounced straight line from radiator to rear, at the line of the hood hinge, a cowl which continues the top lines of the hood, and a decided bevel to the top of the side panels from cowl to rear seat. The sides are almost plane surfaces, without the pronounced rounded flare, which was characteristic of the cars several years ago. Radiators as a whole are higher, although the body sides themselves, if anything, are lower than usual, so that the seat backs extend somewhat more than formally, above the line of the body. This gives the cars a longer and more rakish appearance, which is enhanced by the more general practice of extending the frame horns to the rear to a greater distance than formerly.

This lengthening of the frame, which is made possible by the more general adoption of the flat type of rear springs, in many cases underslung, provides somewhat easier riding as well, because it gives the effect of an increased wheelbase. In fact, the wheelbase in general has been increased quite considerably, a matter which makes for greater roominess. This is particularly appreciated in the class of cars usually referred to as four-passenger roadsters, or any of the close-coupled type of body, in which during past years there has been a notorious lack of leg room for those whose fortune it was to be occupants of the rear seat.

This lengthening of the wheelbase has made possible, and also has possibly been brought about to a great extent by the greater leaning toward seven-passenger bodies as distinguished from the purely five-passenger type. This development is a most logical one, inasmuch as the motorist who normally uses a five-passenger vehicle, frequently finds himself in need of capacity for two extra passengers. The disappearing spare seats are appreciated when needed and the extra room provided in the tonneau when the spare seats are folded down usually comes in handy.

Options in Body

That trait in human beings which gives them a greater pride of possession of something distinctive and individual has called for the manufacturers of motor cars of the better class to provide for bodies which, if they are not individual designs, at least, give that impression. This is obtained ordinarily through special colorings, or options in the way of wheel equipment, etc., and is a factor which really came into general recognition a year or so ago, when several makers offered options of painting jobs, and varieties of color combinations which were not obtainable before.

Others provided a custom body department, which carried out the individual purchaser's ideas of a motor car throughout the body. It is doubtful that this movement will be very greatly increased during the coming year because the increase in the price of the car has been often about the cost of this special work, and it may be that labor conditions and other similar influences will offset any possible increase in demand on this score.

A rather illogical development of the year has been a decided increase in the bore of the engine, which, together with somewhat increased efficiency, means greater horsepower, and, therefore, car salability. In spite of its advantages in increasing the horsepower per pound of car, such an increase is not one to be expected when fuel and oil economy are among the war necessities. It is doubtful if next year there will not be a reaction toward the smaller bores, and lower power.

That the tendency of the last few years for the multiplication of cylinders has been arrested, is not to be wondered at. Questions of economy, both in first cost and the maintenance of the car when wartime economy is a watchword have been sufficient to prevent any additions to the roster of eights and twelves. The sixes and fours maintain about the same relation as previously, with the sixes being used on a greater number of chassis models, and the fours on more cars actually produced.

All Set for New York Show Saturday

Dozens of Cars Have Reached City and Await Completion of Decorating

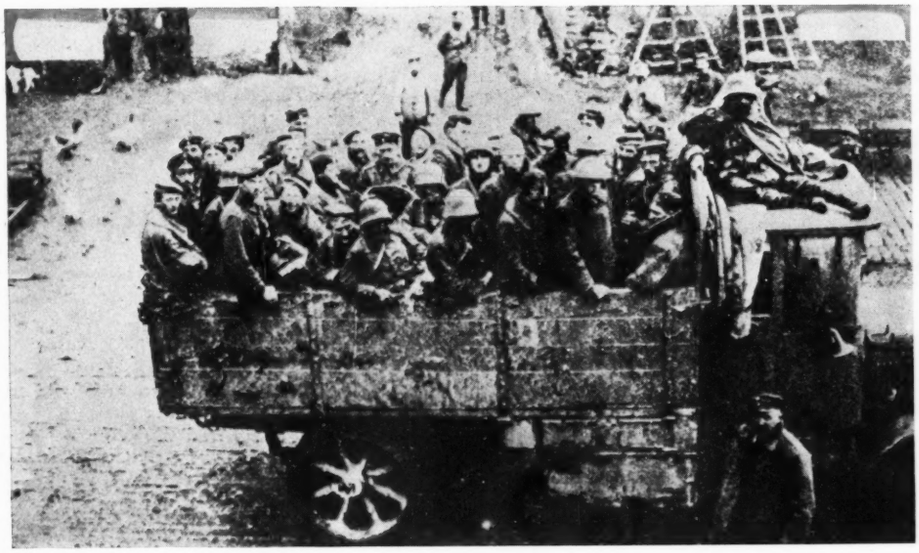
NEW YORK, Dec. 29—Everything is set for the opening of the New York national motor show a week from to-day, when eighty-eight car and 250 parts and accessories makers will exhibit. Dozens of new show cars already have arrived in New York and are ready to be placed in the Grand Central Palace as soon as the building is ready to receive them.

The decorations are keeping a corps of artists busy, and have for the last six weeks. A patriotic and warlike scheme has been worked out through the utilization of the Stars and Stripes and flags of the allied nations. Hundreds of hand-painted curtains, so executed as to have the appearance of tapestry, and bearing designs of crests, coats of arms, pictures of crusaders and medieval warriors, will help produce the desired martial atmosphere, while numerous service flags at the booths will indicate that the war is reaching home for the thousands of motor car men now in the service.

On the main floor the tapestry banners measure 7 by 14 ft., and each bears the name of the car at whose booth it is displayed. Boxes of plants and vines will fill the window sills, while shields representing the Flame of Liberty, with the flags of the allies arranged radially, will ornament the pillars on the main floor.

With close to a fifth of the entire motor accessories and parts industry represented among the exhibitors the eighteenth annual show of New York promises to be far from the down-hearted exhibition rumors have been predicting it would be. With nearly 500 cars and chassis on display, the ensemble will be complete, and there the thousands of visitors will find all that is new in motor car design, with those features continued into 1918.

The accessory exhibits will be found on the upper floors of the Palace. Many new devices to give aid and comfort to the motorist have been offered during the last few months, and in this display the owner or prospect can find a comprehensive review of the modern devices that have been designed to add to the comfort, convenience and economy of motor cars.



These two photographs were reproduced in German newspapers and are the first to reach this country showing American soldiers captured by the Germans. Above is a truck transporting them while below they are being questioned by officers

COMMITTEE SPEEDS WAR WORK

Washington, Dec. 28—The pressed steel plants of the country have combined into an association called the Pressed Steel Service Committee and opened an office in the same building with the Automobile Industries Committee. H. L. Green, formerly secretary of a pressed steel makers' association, Cleveland, Ohio, is in charge. The office co-operates with the Automobile Industries Committee by supplying a list of presses, a survey of the various plants and lists of idle presses so that the committee knows where to place the contracts with the least disturbance to industry. It is planned to form similar associations among other makers in the forge, brass foundries, brass finisher plants and others.

The Automobile Industries Committee has inaugurated a plan for sending out bulletins to manufacturers informing them of Government requirements. Bulletin No. 1 calls for several million adapters, bulletin No. 2 for machining capacity for 75 mm., 155 mm. and especially 4.7-in. shells. Bulletin No. 3, the last issued, calls for 4500 trailers for overseas shipment, to be fur-

nished during February, March and April. These trailers are for the Signal Corps, and contracts are awarded in quantities of 1500, 1000, 750 or 500. General specifications include two wooden wheels, 35 by 5, pneumatic tires, solid axles, tapered roller bearings, 5-in. standard structural channel frame, length 21 ft., width 49 in., platform of ⅞ in. yellow pine, 21 ft. by 6 ft. 9 in., semi-elliptic springs 3 in. by 54 in. solid channel tongue, 2000 lb. capacity, no steering device. Bids close Dec. 31. Master blueprints will be furnished manufacturers receiving contracts.

Further bulletins will be issued as required. The committee prints drawings of block dimensions where possible but in the case of blueprints does not publish these but sells at cost to makers. Many blueprints are not displayed except to reliable manufacturers considered trustworthy by the committee and the Government, to maintain secrecy about important military affairs.

Following the organization of the big shell company of Detroit motor car makers, the committee now plans to organize like companies of car and parts makers at Jackson, Mich., and Cleveland, Ohio, and possibly in several other cities.

The nine engineers with the committee now are making surveys, investigations and acting as guides to makers who have secured contracts through the committee. Other plans for further promoting the Government work in the plants of the motor industry are being made by the committee and will be inaugurated as speedily as possible.

DETROIT TRUCKING EXCHANGE

Detroit, Dec. 28—To relieve terminal and warehouse congestion and help the freight car situation, the Packard Motor Car Co. has established a Detroit trucking exchange, which is simply a truck clearing house. All owners of trucks for immediate service are listed, and any owner desiring an additional truck for local or long distance work advises the company, and a truck is obtained. This is done without charge, keeps material moving and trucks working, two things necessary to winning the war.

Developments at Capital

Christian Girl Assumes New Role While Ford Looks Into Shipping

Labor Department Denies Existence of Shortage

WASHINGTON, Dec. 28—Week developments in the automotive industry here indicate an ever-increasing tendency to select men who are masters in their own departments and who have made good in the work they have had in hand. The placing of Christian Girl, president of the Standard Parts Co., Cleveland, Ohio, in charge of the Quartermaster's Mechanical Transport Engineering follows Mr. Girl's unqualified success as chairman of the Military Truck Production Board, which position he will continue to hold. In his new capacity Mr. Girl will have complete supervision of the completion of the design of trucks and other transport engineering work which comes under the quartermaster's department. It is understood this includes all problems of design for the mechanical transport work and all engineering problems relating to this. As chairman of the Military Truck Production Board, Mr. Girl has had much to do, in fact nearly all to do, with the speedy production of the class B heavy-duty war truck. He organized a department which has looked into the problem of materials as well as many other kindred problems. He has done valiant service in this work and undoubtedly his new position will be handled with a similar efficient hand.

Henry Ford has broken into Washington spotlight again in connection with the Shipping Board. As reported in MOTOR AGE last week, he has been given permission by Edwin N. Hurley, chairman of the Shipping Board, to make a trip through the South and inspect conditions with regard to transportation, supplies of iron, fuel and labor with a view to erecting plants through the South in which standardized ships will be manufactured at the rate of six or seven a day, the plan being to use an assembly system similar in some respects to the assembly plant in the motor car industry. The Government will throw its money and resources back of this movement if Ford reports the plan desirable after he has completed his investigations. Mr. Ford starts his tour of inspection this week. While nothing definite is announced, it is expected that these ship-building activities will be largely carried on along the shore of the Gulf of Mexico.

Considerable criticism is heard in many parts of Washington concerning the widely circulated reports of a shortage of labor. This shortage of labor reported from many parts of the country through the daily press has been given further circulation by the addresses of Frank E. Vanderlip in his campaign on the War Saving Certificate movement. The Department of Labor states that there is no justification for the present hysteria about the scarcity of labor and that no industry or industries or classes of skilled or unskilled laborers fit into Mr. Vanderlip's statements. From information obtained through its employment agencies the department declares it does find a certain shortage of labor on what might be termed the fringe of the country, by this being meant seaports and coast district, but that in the balance of the country an actual surplus of labor exists.

Labor Reports

For example, the department recently received word from Kansas City, Mo., to the effect that that city could supply 200 men a day for several months, if necessary for labor from that section to be moved into some other sections. The Department of Labor reports statements from other parts of the interior of the country, where there is a surplus of labor. The chief reason ascribed by the Department of Labor to a shortage where it does exist is that of the short time allotted for the adjustment of conditions and the department believes that such conditions gradually are being remedied without radical changes.

The Department of Labor is emphatic in its denunciation of reports circulated through the daily press concerning a labor shortage and says that the cause for such hysteria is due to wrong impressions from individual cases magnified into national importance. The Department of Labor cites one example of this. Recently the civil service department issued bulletins calling attention to labor shortage and the need of workers. When the Department of Labor investigated it discovered that there was a call but for 150 people, most of whom had to be highly technical.

The department has issued exhaustive figures on the labor situation showing demand and supply throughout the country which bear out the statement that the alleged shortage does not exist. For example, 418,810 people were asked for by employers in a certain period and during that period 413,649 people made application for the position. During that period 283,799 workers actually were placed. During October, 1917, 83,920 people were asked for by employers and 69,931 people applied. There were 51,093 actually placed in employment. September figures show

German biplane bagged by British in the Cambrai drive. It can be identified easily by the huge iron crosses on its wings

requests for 84,226 people, applications from 57,031 workers and 46,586 people placed in positions.

On the whole Washington conditions appear completely favorable to the industry. There are and always will be in all likelihood individuals arising who think the only remedy for the different crises that must occur in wartime is to cut down or cut out something or other, but the majority of Washington officials appear now to be so agreed on a safe and sane handling of the general industrial world that we can assume that these exceptional individuals will not be allowed to proceed far with their theories.

PROMISE DEALERS TRUCK ROADS

St. Louis, Mo., Dec. 31—Improved highways between this city and various Michigan cities, which will serve motor car dealers in the place of railways, was the promise held out last week at two conventions of dealers in this city. The Hupmobile dealers, gathered here upon invitation of the Weber Implement & Automobile Co., heard this promise from Lee Anderson, vice-president of the commercial division of the Hupp Motor Car Corp.

The Dort and Reo dealers, gathered here upon invitation of the Cardell Motor Car Co., heard the same message from John D. Mansfield, sales manager for the Dort Motor Car Co., and C. E. Eldridge, assistant sales manager of the Reo Motor Car Co. Driveways of the future and the prospective new uses of cars were the chief topics.

TRUCKS IN DRIVEAWAYS NOW

Detroit, Dec. 28—Truck manufacturers are falling in line with the passenger car manufacturers and using the driveaway method of getting the trucks into the hands of their dealers. The J. C. Wilson Co. is driving trucks as far as Boston, Philadelphia, Baltimore and other points. In spite of the road conditions the saving in time and freight is considerable, as compared to railroad transportation.

Careful records were kept by the Baltimore dealer on his last drive. The trucks were the 2-ton type and each carried a certain amount of parts for the Baltimore service department. The 543 miles were covered in four days, the trucks passing through Toledo, Cleveland, Youngstown, Pittsburgh, Uniontown, Cumberland and Baltimore. The average number of gallons of gasoline a truck consumed during the trip was 62 and each used a gallon of oil. The total expense to a truck, including not only the immediate expenses, but also the insurance, mechanical wear, proportional to the yearly overhead, etc., was $62.91. The cost a day a truck was $15.56, giving a mileage cost of .116 cent or a ton-mileage cost of .058 cent.

Dodge Brothers likewise are delivering their new commercial car overland, and this will be done the entire winter regardless of weather conditions. Already cars have been delivered to Lawrence, Kans.; Atlanta, Ga.; Hannibal, Mo.; Paris, Tenn.; Waterloo, Iowa; Cincinnati, Ohio; Davenport, Iowa; Johnstown, Pa.; Terre Haute, Ind, and Chicago.

Truck Train Ends Trip

First Overland Journey of New Era in Driveaways Proves Success Throughout

Trial Proves Feasibility of Motor Transportation

WASHINGTON, Dec. 29—The motor truck convoy which left Detroit to make the first test overland drive to the Eastern seaboard Dec. 14 arrived at Baltimore yesterday. One of the thirty trucks starting the journey failed to finish, having been struck by a train en route. The trip marks the completion of the first military drive-away overland and the beginning of a new era of driveaways. Orders were issued immediately following the end of the journey by Major Miller to all motor companies shipping war trucks East hereafter to utilize the highways of the nation for driveaways in all instances.

This trip was a preparatory one, for educational training, and resulted in a conference at Washington about the lessons learned on the trip which the War Department refuses to discuss publicly. The trip was very successful, and six similar truck trains have been ordered to leave next week from Detroit to seaboard, carrying supplies.

The snow organization was bad in Michigan and Ohio, but the highway transports committee believes both these states have learned complete lessons from this trip in regard to snow organization. Pennsylvania and Maryland, however, had their roads in excellent shape, using only men and shovels, because the snow plows did not arrive in time. The Highway Transports Committee wants all highway departments to remember that trucks demand wider clearance on roads than passenger cars. The committee is taking up this matter and also the further clearing and repair of roads enroute.

Every truck driver on the trip was a green man at the start of the trip and finished as an expert truck driver, ready to drive trucks abroad. This shows how productive this training is and will be when the Liberty trucks start overland.

The journey was made slowly under orders from the War Department, averaging 50 miles a day.

The complete convoy comprised twenty-eight 3-ton Packard motor trucks, two Packard oil tank trucks, one Dodge Brothers five-passenger, one Dodge Brothers roadster, one Dodge Brothers light delivery truck and one General Motors light ambulance truck. The personnel included:

Captain Bennett Bronson, Quartermaster Corps, in charge of convoy.

Lieutenant C. A. Riley, Quartermaster Corps, in charge of motor train.

Lieutenant L. J. Ward, U. S. M. C., medical officer in charge,

Eighty National Army men.

Captain E. B. Butchers, representing U. S. Engineers' Corps.

H. C. Ostermann, representing Highways Transport Committee.

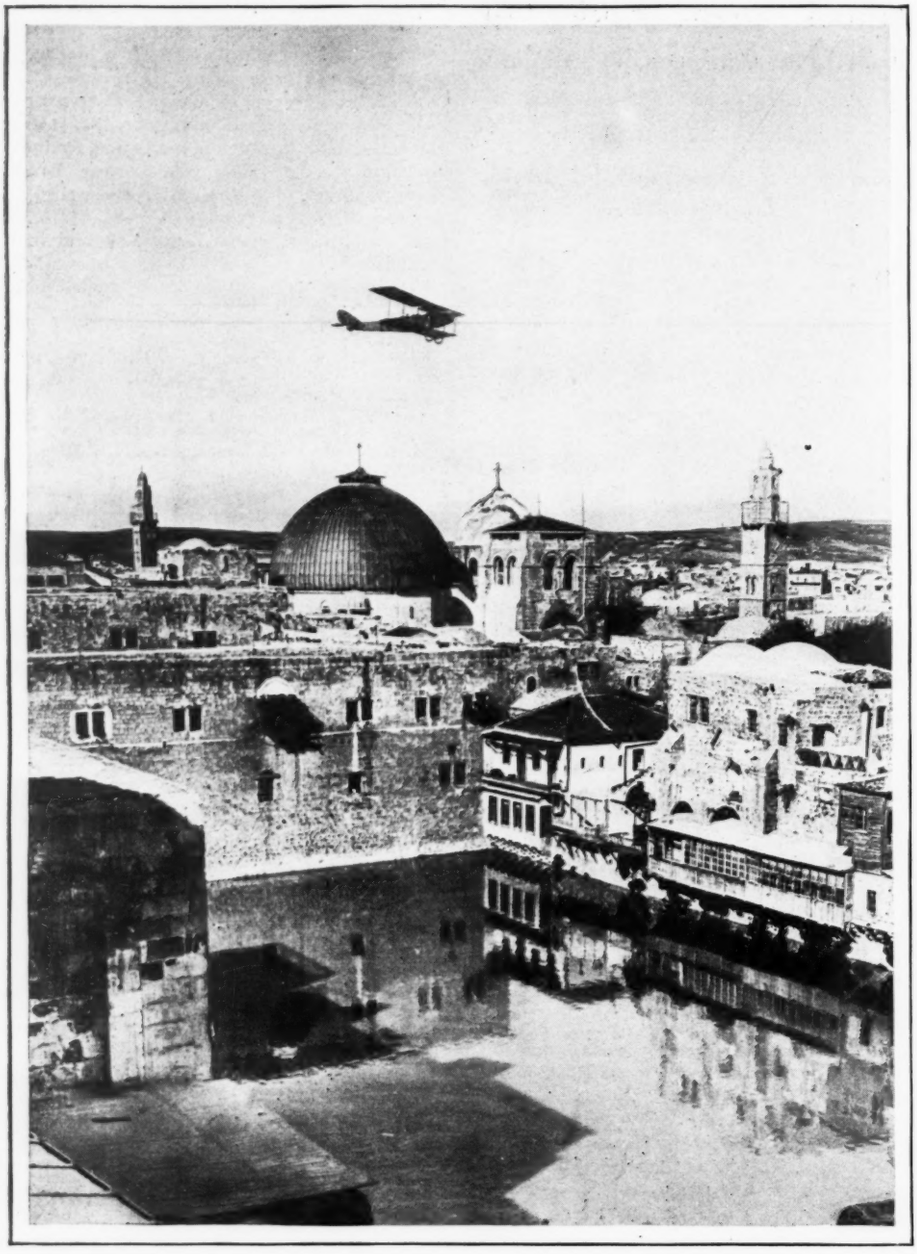
The trip is remarkable in view of the fact that none of the drivers ever drove any truck before but were men taken from an infantry camp and placed at the wheels. Weather conditions were the most adverse possible. The convoy left Detroit at 4 below zero and fought through snow all the way up to Pennsylvania. Schools let out along the route, business men, military men and professional men turned out to give welcome to the trucks and the Red Cross had hot meals ready for the soldiers at every stop.

The trip completely proves the feasibility of motor truck transportation in all kinds of weather.

BY TRUCK FROM DETROIT

Chicago, Dec. 29—As a solution of the shortage of railway equipment Harry Newman has established a motor freight line between Detroit and Chicago, a distance of about 300 miles. The first caravan to make the trip arrived here Christmas Eve in perfect condition. It consisted of fifty-three 1-ton Maxwell trucks upon which were mounted fifty-three Maxwell passenger cars. This is the largest shipment received here by overland under the direction of one man. Ray McNamara, Maxwell road engineer "conducted" the 106 motor vehicles on their trip.

Headquarters of the aviation section of American expeditionary forces in France. The headquarters are in Paris



IN THE HOLY LAND AND OTHER CLIMES WHERE MOTORED IS THE WARRING MAN

Symbol of modern warfare, a lone airplane soared over Jerusalem as this photograph was taken. Jerusalem was the main objective of the British in the Palestine drive to deliver the city from the Musselman. It has since been delivered. In the foreground is one of the holy pools. The Mosque of Omar of the Dome of the Rock on Mount Moriah, where the old temple altar stood and where sacrifices were made in biblical days, can be seen in the center

Cheering thousands greeted the great war procession organized by London's Lord Mayor as the great British war tanks rumbled along in the procession. Tanks similar to these shown in the photograph have appeared on this side of the pond, in Canada's war parades, to raise money for the successful pursuit of the war and for other purposes, and in New York parades. The recent successes of tanks in battles on which much depended made the interest greater

Satisfying the large appetites of our boys in France is a tremendous undertaking and hundreds of men are detailed to this duty alone. White bread, a luxury unknown to the French for a long time, is served to them daily. Thousands of sacks of flour are consumed daily in supplying the soldiers. Here men are unloading flour from a freight car to a camp motor truck

All the flour, as well as most of the other foodstuffs for feeding the troops in France, is transported from the United States. Here a truck is transporting bread from the storehouse to mess tents. All bread must be at least a day old before served to soldiers, and the day's output is kept in the storehouses overnight

The first groups of French motor vehicles as they arrived in Milan, Italy, to get busy against the enemy. They are transport trucks for use in bringing up supplies of all kinds and even troops. The allies rushed reinforcements to Italy to stop the German advance and these tried veterans are part of their assistance

EDITORIAL PERSPECTIVES

The 1918 Spirit

THE spirit of the college athlete going into the final football game of the year for championship honors, the spirit of the marathon runner preparing for the great international honors, the spirit of the baseball pitcher approaching the deciding game of the world series, the spirit of the patriot with his back to the wall ready and prepared to resist to the last; such is the spirit of 1918. Such is the necessary spirit of 1918, a year in which we have to accomplish individually and collectively immeasurably more than we have individually and collectively accomplished in any previous year of our life.

IN 1918 we must bury self more than we have ever buried it in any previous year. This will be our hardest task, the one calling for strongest determination in those quiet hours when our only comrade is our conscience. During the year we will be called upon to make our sacrifices of human life, our sacrifices of money, many sacrifices of pleasure, of ease, but through it all we must keep our physical self and our mental self and our moral self at a higher standard than heretofore. The needs of the year require it. The runner cannot win his greatest race unless he is in the finest physical condition. The same applies to the aviator who would win his ace on the front; the same applies to the soldier who will be the hero when the boys go over the top, and the same applies to us at home, who must do a great deal more than "keep the home fires burning," in that we must provide all of the necessities of war outside of that great physical, mental and moral force embodied in our soldiers and sailors and those who go direct into the field to keep them fitted with all the essentials of the combat.

THE year 1918 calls for the superior brand of courage, that courage which only war and its super achievements and its super sacrifices call into existence. It calls for this super courage in our work of every day. We must analyze our daily work with a clearer mind. We must accomplish more than we did in the same day in 1917. The work of the world is greater, the number of workers is fewer and on each of us rests that added burden, which we must take up willingly, eagerly, and carry our load of the work we have in hand, "making democracy safe for the world."

Our First War Models

WITH nine months of war, and with the effect of war on retail sales dating back practically eight of those nine months, we could not expect other than that our makers would trim their sails according to the course of the wind. The 1918 expected new models are not with us, and for 1918 we have but a continuation of our pre-war models, as history may name them. Few of the engineering plans of 1918 have been carried into the chassis that will be seen at our shows, excepting in those cases where business judgment deemed it best to bring out the new models because of the reduced sales resistance that they would bring about.

OUR 1918 cars are generally the carried-over models of 1917. It had to be so. The year 1916 marked an epoch in production and for 1917 large orders for parts were generously placed. The activity was nipped when the season was opening, and it has been necessary for makers to carry over their models of 1917 to clean up stock that would otherwise be largely lost. Steels are too high and labor too scarce to be extravagant and so today we must be content with what we have carried over.

IN the category of those minor changes that have been made are not a few movements that should tend toward higher efficiency; we prefer the expression "higher efficiency" rather than the oft-used expression, "greater economy." Efficiency is a positive term; it represents a positive activity, an accomplishment, the expenditure of effort and the attainment of some objective. "Greater economy" is negative compared with "higher efficiency" and has in mind curtailments, reductions, doing without things.

WE had hoped that weight would have been cut out of our 1918 models, but it has not; in fact, weight in many is a little higher because the wheelbase is longer, the tires are larger and the necessary changes have added materially. This is unfortunate and we hope in the war models that will come out during the year this prime consideration of weight will receive more attention. Weight must be reduced, and those makers who give this prime consideration will profit tenfold and perhaps a hundredfold for their labors. Our cars are too heavy, with two or three exceptions. They consume too much gasoline transporting their own weight. They wear out too much tire rubber and fabric. They rack and tear themselves needlessly.

OUR best racing cars have exploded the long-cherished conception that weight is essential to hold the road. The cars that are traveling 114 m.p.h. on our speedways are lighter than those that used to make only 75. In road racing it was discovered that distribution of car weight, balance of parts and design of front axle had more to do with a car's ability to hold the road than mere weight. Unfortunately, these lessons have not been brought into regular design as they should have been. The irresistible demand for low price has been responsible for this as well as for many other shortcomings. Everything had to give way to production and to price. The production manager and the sales manager exerted a little too much influence.

OUR war models, or our higher efficiency models, must go a long way's further than our pre-war models have. Our cars still fall far short of what they might be. This is not a criticism of our makers, but an analysis of our war problems, because it is extremely difficult to make one model that will meet the demands of the world. We have made an error in trying to do this in the past. We hope war efficiency will set us right.

CONSIDER the ask of attempting to make the same car work satisfactorily in Quebec and Mexico City, Havana, Rio Janeiro and Petrograd. The task is impossible. Being slaves to production we have decided that we can build only one model and that must go into the sands of Egypt, work

under the equator at Quito and serve in Alaska. The production models have done this but not efficiently, not nearly so efficiently as might be. The radiator capacity that gives good engine efficiency in Panama cannot possibly serve best in Quebec or Patagonia. Bring the argument right to our homes and the radiator that gives good efficiency in summer months is not satisfactory in December, January, February and parts of March. There is perhaps just enough radiator at one time and not enough at the other. The sectional radiator is bound to come. It can be in three or five sections, all in use in hot weather and perhaps three in use in medium cold weather and only one in use in very cold weather.

HIGHER efficiency must take into consideration the fuel problem. We must cut out this expensive heating period or cut it down so that its damages are greatly minimized. We must not object to more fussing with the carbureter if by such we can accomplish such a desired end. We must not look upon complications as such if the carbureter gives that higher efficiency which we need. If it is necessary to install electric heating coils, then we must handle them if they will do the job.

NO open touring car sold in the north temperate or south temperate zones as well as in the north and south frigid zones should be sold without a heater. There should be a heater for the front seats as well as for the back seat. It is preposterous with all of the heat from the exhaust being wasted that higher efficiency does not take a hand and give a little of that efficiency by way of comfort that is so badly needed. Give the driver a heater for his feet because it insures greater safety in the operation of the car. Give a heater to the passenger who shares the front seat with him. If lifting of the footboards at present stands in the way, set about in a courageous war spirit and master that problem. It is a small one compared with other problems which have been solved.

EVERY car should have side curtains so that the curtains when in use open with the doors. The oiling system should be so unified with the engine that it is first to warm up to the engine temperature rather than being so arranged that it is last to warm up. The oiling scheme in this regard is different in a passenger car for use the year round from that of a racing car which is only used in warm weather. In the latter cooling of the oil is important. If oil leads must be brought to the dash for indicating purposes then they should be protected so as to give good results in cold weather, because the winter use of cars must increase and our car designers must more and more build to suit the needs of cold weather.

Engineering of Industry

THAT there has not been as great advancement in the engineering design of passenger cars during the last season as has been the case over similar periods of other years is not any reflection upon the motor industry. On the contrary it is an evidence of a desire of passenger car manufacturers to assist the nation in every way possible in its time of need. Not only has the industry turned over to the Government its factories in whole or in part, its mechanics and the heads of its executive and administrative departments to do their part in the prosecution of the war but just as fully have the engineering forces of the industry been gladly offered to the nation for the development of those features of the automotive industry that are needed most quickly for military and naval success.

OUR designers have produced the designs and superintended the construction of the Liberty aviation engine, of the three standard war trucks and of a number of other no less important units of military and naval value which for the time being cannot be mentioned. Not only in the military field have these achievements been made, but engineering achievements which ultimately will prove of great importance have been made in the agricultural tractor. The Nation's need for power-farming equipment and power transportation equipment to replace the animals which have been taken into war service is great. Thousands of mules have been shipped across the water each month for the last several months. Thousands of horses are going. This great drain of animal power has to be replaced. The motor industry has accomplished much, but it has been along different lines than those of the past. Instead of spending its efforts on new creations in passenger car mechanisms, the engineers are donning uniforms or serving the Government in a quieter way.

WELL, we've motored past another milestone. A new road opens up before us, unexplored, untraveled, a clear way ahead. The bells of Time have rung out the old, rung in the new!

Let us set forth with stout hearts and sunny souls, sobered by past experience, renewed with hope in the future, strengthened with faith in our brotherhood, particularly the brotherhood of good motorists!

These are thoughts to which we turn with relief, glad to shift our twelve-months' burden and start afresh. Sometimes the traveling was good, the road was even, the day was fair; sometimes 'twas slow and painful going, up long and fearful hills, through deep and rocky valleys, often breaking miserably down by the wayside, and often stopped in our heedless speeding by the policeman of Nature and forced to serve our time in the stationhouse of Remorse. But we have learned the Law!

As we linger in retrospect there are accusing phantoms that crowd about us, phantoms of banished ideals, broken resolutions, unconquered sins, but in their mournful faces there is warning also, and abjuration, which we must heed. Because of this we begin the new journey with humbler hearts and chastened spirits, trusting not so much in ourselves as in that great Chauffeur who knows so well the road that lies before us.

Soul, is the running gear right?
Now gi' us a hand, my trusty friend!
And here's to a Happy New Year for us all!

War's Effect on Industry

Engineering and Merchandising Aspects of Influence on Motor Car Business Discussed

NEW YORK, Dec. 28—The effect of the war upon the motor car industry was considered last evening by a meeting of the Metropolitan Section of the Society of Automotive Engineers. This meeting was without precedent in the history of the section in that it departed radically from engineering lines and became a discussion of the merchandising aspect of the business.

The discussion began along engineering lines with a paper by A. Ludlow Clayden of Automotive Industries, who pointed out the probable changes that will come in the design of cars as as result of the war. Several large New York dealers listened with interest and took part in the discussion. Mr. Clayden pointed out that we are passing from an era in which we are trading "what will she do on high?" for "what will she do to the gallon?" He stated that the cars now in demand are those that are economical and generally small and that the car of ten years hence will be operating on a fuel which could not be used in cars of to-day, even though it may then be called gasoline, as is our fuel of the present. The price, he said, would possibly be a third that of present commercial gasoline.

The merchandising aspect of the situation, the effect of the war on dealers now, during the war and after war, was treated in a paper by Ray W. Sherman, editor of Motor World. Dealers, he said, must alter their businesses in many ways if they are to continue throughout the war with satisfactory volumes of business. When business is affected at one point, volume must be created at another point. More aggressive methods must be used and business and merchandising must become more efficient. The end-of-the-war period should see a highly efficient group of dealer-organizations all ready to step forward into the peace period with great prospects of big business.

Emlen H. Hare, president of the Packard Motor Car Co. of New York, told how his company had analyzed the situation and discovered why it is essential for business not to be permitted to slacken. He said patriotism is not a legitimate excuse for not buying goods and told how the New York Packard branch is running newspaper advertising to build public opinion of this kind.

William L. Colt, manager of the Overland business in this city, expressed similar sentiments and emphasized the fact that it is the duty of the dealer to keep himself fit for continuous business.

The principle of expansion of industry as an industrial wartime necessity was asserted by David Beecroft, directing editor of the Class Journal Co. He decried the mistaken policy in some sources that war results must come through curtailments and declared that our whole industrial organization must be expended for greater needs rather than be cut down to make room for new products.

The papers follow:

War's Effect on Automobile Industry

By A. Ludlow Clayden

There are hardly any prophets left who will venture to predict the duration of the war. Lacking any definite ideas on this subject it is hard to anticipate the effect of the war on the American automobile industry in the ultimate. To make any sort of analysis it is necessary to assume that the war will last a substantial time, a year or more at least.

If the war does not end before Dec. 27, 1918, the passenger car industry of this country will still be one of the greatest industries of the United States outside of munition making, which will be temporary. It will maintain its position because America is the world's automobile factory, just as China and India are the world's tea centers, just as Brazil is a coffee center. The United States is the logical place for the manufacture of the bulk of the world's supply of passenger cars, and as long as that is true, just so long will passenger car making be one of the mainstays of the American trade.

Change in Engineering

War is having an effect upon every last detail of civilized life, and it is going to affect automobile design, just as much as other things. We to-day are entering an era in which the highest ideal of a man or of a nation is the ideal of economy. Never before in history has economy been more admired than extravagance, never before has a change in public sentiment been made so swiftly. The American nation, a leader in so many things, for fifty years has been proud of the fact that its resources permitted it to be a leader in extravagance. Like the wealthy man who demands the best of everything, America has been the wealthy nation able to pay for whatever it wanted. If spending was to be a human ideal, then the American was better able to spend than a man of any other nation.

Now this is all changed. The admired man to-day is he who though able to spend on personal gratification, holds back and contents himself with something smaller, giving the balance to the vital needs of the day. This is not a temporary condition to end with the war. It is a condition which will last long after the war is over, a condition which is being impressed so strongly on the minds of the now adolescent generation that it well may become the ruling spirit of the next hundred years.

A long period without any serious wars, a hundred years it has been almost, has brought about the conditions we know. This awful catastrophe of the last three years will cause such an upheaval that we shall never return to where we were.

If these premises are sound, then the American passenger car of the near future is going to be one in which economy is a strong feature. A car of which the first cost, plus the maintenance cost over a period of years, will make a good showing. We are about to exchange "what will she do on high," for "what will she do to the gallon?" It is a fact that already those cars which have a reputation for economical operation have suffered far less than those which are known as wonderful performers.

The volume of passenger car business being done to-day represents little more than the essential trade which supplies transportation to those who need it. The whole agricultural life of the whole United States, and a good half of the business life of small towns and large cities, depends to-day upon passenger car transportation. The farmer's timetable of his week's work is laid out on a schedule that necessitates a car to get him from point to point. And on the city side, just imagine, say, Philadelphia bereft of passenger cars. Think of the utter impossibility of living in Philadelphia's residential districts without road transportation.

The last years of American town planning has been on an automobile basis.

The amazing increase in America's agricultural output is due to the rapidity of ground covering provided by the automobile.

Average Too High

But the average American car has exacted too high a price for the service it rendered. Not too high a first price, but too high a maintenance price. It has been too big, too heavy, too powerful. Too extravagant of fuel of oil and of tires. Too frequently in need of repair.

To take just one instance: it is absurd to utilize 2 tons of machinery to carry a man 10 miles from his home to his office. It is equally absurd to provide his car with an engine which normally has a fuel efficiency of 10 per cent, when it could have a 20 per cent efficiency by sacrificing the ability to crawl on high gear.

I do not wish to quote the European example as in any sense a criticism, but it is true that European cars have been much less costly to operate. They had to be because of the much smaller average wealth. The European had to have an economical car or none. This is the reason why motorcycles have had such an immense vogue

on the other side of the Atlantic. The average American says "I can't ride a motorcycle. It isn't in keeping with my position, my friends would roast the hide off me." True enough—last year—but will it be true next year?

Similarly it has been an ideal to have a hugh car, an ideal fostered by advertising and by salesmen everywhere. Without doubt the big car has its comforts, but the little car has conveniences which more than counterbalance. Nobody who has tried both would ever choose a 140-in. wheelbase car for shopping in preference to 110-in. one, provided both were of the same standard of engineering. At present engineers, then, have two ways to work, one toward a car which is more economical because it is smaller, another toward a car which is more economical because it is inherently better.

What Trade Awaits

It is just a personal opinion, perhaps worth quoting in passing, that the greatest trade open to a magnetic system of transmission is in a car with about 110-in. wheelbase, a 200-cu. in. engine and made in a quality which will make its fair price around $2,000. A car which is not meant to do much on high, a car perhaps which has no high at all, automatic gear ratio variation being a part of the transmission.

There is another thing. We are nearly at the end of gasoline as we know it. We doubt the fuel ten years hence still will be called gasoline, but it will not operate a 1918 gasoline car. We have got to learn to sacrifice the absurdities of flexibility existing in the modern engine to use a fuel which we will be able to buy for a third the present price. There is nothing to prevent a man lighting cigars with dollar bills if he wants to, but the world at large thinks it silly when matches are so cheap. At present the automobile is running on dollar bills instead of dimes with little more real reason.

That it is doing so is due to the fact that the ideals we have worked for have been ideals which ended perforce with the coming of war. The automobile has been one of the great inventions of civilization. It has altered for the better conditions of life in almost every country on earth. Yet all the time it was doing this it was being designed for pleasurable performance rather than for the useful work which formed the major reason for its existence.

If motoring were merely a luxury now as it used to be fifteen years or more ago, then the annual output of cars in America would perhaps be 100,000 or less. The world has taken a luxury offered to it, and used that luxury as a necessity. It is time that the true reason for the enormous demand for cars was appreciated and reflected in automobile engineering and design.

War's Effect on Dealers

By Ray W. Sherman

In considering the effect of the war upon dealers it seems logical that we should consider the effects now, in the future during the war and after the war.

So far as the present effects are concerned it seems that dealers are divided into about three classes:

1—The class that has been very adversely affected.

2—The class that is in the transitory stage.

3—The class that has not been affected or has so revamped itself that it is not suffering from a business depression.

The first class has in some cases been pushed out of business by circumstances, and some of these circumstances are due as much to the dealer as to the war. The dealer who had his business on a sound foundation, who was prepared to meet changes as they came and who was long on figuring in emergencies fared well, but the less capable element in the trade has been hit the hardest. This, however, is sometimes due to the car, for, as Mr. Clayden has said, not all cars sell well. There are good sellers and bad sellers in these times.

The second class is the dealer who has a good organization, who has had pretty good agencies and who has enjoyed a good business and now sees it falling off. He knows he is in a bad hole and stands in danger of getting in a worse hole, but he has not grasped the situation in a firm and able manner for the purpose of working out his salvation. There are certain things every dealer must do at this time and the dealer who doesn't take hold of the situation and work out the necessary adaptations must obviously suffer.

The third class of dealers is perhaps small, especially in this part of the country. Its business is good. There are a few dealers who are selling more cars at present—or at least during the last few months—than they sold a year ago. In the western farming sections the business is not so bad. Some of the farmers are holding off on winter buying but say they will buy in the spring. Their reluctance is due to the farmer's frame of mind and his habits rather than to any business cause. Dealers in those sections are suffering somewhat from winter depression but not so much from war depression.

The reason certain other dealers in sections where the depression is felt most have not slumped is due to their methods and their cars. There are some cars that would be hard to sell at this time by any organization. The demand is not for the big heavy cars but rather for the smaller and more economical cars. When it comes to big cars they can be sold provided they happen to be in the millionaire class. But a big heavy car that is in the medium-priced class is not so great an attraction.

Limousines are not easy to sell. Many prosperous owners have discharged their chauffeurs and are buying sedans. One dealer has a waiting list of two or three dozen chauffeurs who have been discharged by their owners. Another dealer says he must convert his stock of limousines into cash at cost in order not to stand a greater loss by carrying them too long.

Aggressive sales methods are making things better for some dealers. The organization that goes after business at this time with the right sort of car can get the business. It can even hold up to last year's record.

Thus far the possession of a good agency and the use of aggressive methods have helped some dealers get by, but if the war should last a long period all dealers would have to go into the self-adjustment business.

The war will take mechanics, salesmen, office workers and all sorts of employees. There is no use denying it. They will be taken. There will be a shortage if the war lasts very long, and we should plan on a long war, not a short war. This will necessitate adjustments.

What should the dealer be doing on this score to-day? He should take a pad and pencil, go through his whole works, set down the employees who can be replaced by women or older men, mark down shifts that can be made where substitutions are necessary and get all ready so that when the shortage comes he will have plans all ready for putting into effect. He also should scrutinize every part of his business with an eye to possible changes. When he finds the war is going to take a piece of marble out of his business structure he should have a good brick all ready to put in.

Into Taxi Business

One dealer has taken his used cars, painted them yellow, and is netting $100 a week in the taxicab business. Others are putting in machinery that will save labor. A great many are going on a cash basis to reduce working capital. Some are employing women, although the practice has not spread as far as it must. Dealers should look at the woman worker as something other than an amusing spectacle.

Other activities being taken up by dealers are: Trucks, tractors, farm lighting and other things.

Service is getting attention. All dealers would like to see it defined and restricted. Certain other economies will be worked out. Service stations may turn to repairing. Service must be made to pay a profit.

Eventually those businesses that go through the crucible of war will come out refined. They will be in a wonderfully efficient condition for making enormous strides in the period of peace. The automobile trade will be given a grueling schooling in penny-figuring and cost-watching.

The war ought to solve the used-car problem if it does nothing else. It should cause used cars to bring higher prices. The dealer who has a lot of ramshackles in the back room later this year can get them out and make them run. Or he can scrap them and get good money for the materials. Some of these old timers are full of aluminum and other much needed materials.

There is a mistaken idea of economy on the question of car buying among the public and it is causing $2,000 buyers to pay only $1,200 and the $700 prospect to pick up a good used car.

Must Balance Volume

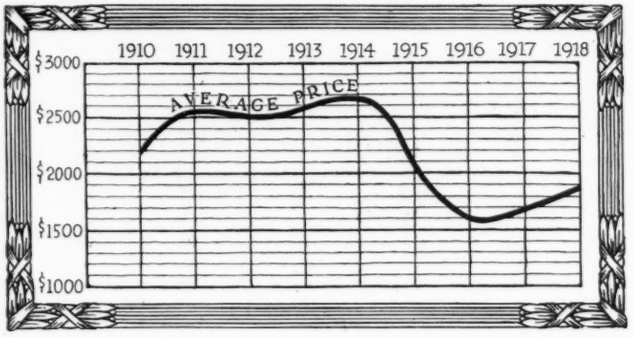
If the war lasts two or there years more dealers will operate on close lines. Their volume will depend on what they make it. If it falls off in one spot they must make it up in another.

They will have women employees. They will advertise and follow-up more efficiently and intensively. They will grab

(*Concluded on page* 32)

The Truth about Prices and Materials

By David Beecroft
Directing Editor Class Journal Co.



THE extra high prices motor car and parts and accessory makers have had to pay for raw and partly finished materials entering into the cars during the last eighteen months represent but a part of the added cost due to the rise in prices. A portion of the cost of these materials which does not appear in the purchase price of them is the cost to secure necessary materials after you have purchased them.

A case in point: Not many weeks ago 800 cars of one maker in the Detroit zone were held up at the factory due to a lack of fasteners for the hoods. These cars, which were finished otherwise and ready to be shipped to the waiting dealers, were being held at the factory and clogging the works by taking up the storage room of other cars that were coming through. To get the hood fasteners meant several long-distance telephone calls with the maker in New England. After the usual routine of contracting for them by letter had been gone through and the usual number of telegrams had been sent, it was necessary to send a man to the factory in Connecticut. On arriving at the town where the fasteners were made he purchased two special trunks and filled them with the fasteners and started for the Detroit zone by way of New York. On reaching New York he secured transportation, two tickets, on the fast Wolverine train for Detroit, and paid excess baggage on the entire weight of the trunks. Before it was possible to get the permission of the railroad for this, two of the directors of the company had to take the matter up with officials of the New York Central to get a necessary concession to take the fasteners as baggage. On arriving at Detroit special motor cars met the train and started off for the town in the Detroit zone where the manufacture of the cars was being held up.

But One of Many

This is but one example and the two pages allowed for this story could be filled with similar examples of how factories have had to spend nearly as much money to get the materials to the factories as they cost. This condition has been present for over six months and with railroad facilities hopelessly disorganized and express systems overworked it is impossible to see any immediate relief.

PERCENTAGE OF DIFFERENT MATERIALS ACCORDING TO VALUE IN AN AVERAGE $1,000 CAR

Steel and iron	35%
Brass and copper	10%
Lumber	5%
Electrical equipment	15%
Fabrics (cotton)	6%
Rubber	12%
Glass	2%
Leather	5%
Balance (oil, grease, paints, etc.)	10%
Total	100%

Perhaps one more example of the trouble of securing materials should be cited before taking up the question of price increases with the different materials entering into the car. Not over six weeks ago a large car maker had expressed a large crate of materials that it was doubtful would arrive in time through the regular freight train channels. Not to hold up the completion of the cars it was deemed best to use the express service. On the day the express package was due the company called to get the crate, but was told it had not arrived. The call was repeated every few hours for three days, the completion of cars being held up and factory production correspondingly held back. Finally, in despair, the general manager of the company went to the express company and thence to the express warehouse to investigate the cause. The huge piles of unsorted express packages furnished the clue that perhaps his crate might be in some part of that pile. He called for four of his factory workmen and with them started classifying the packages of the express company, which had not help enough to accomplish. Finally, flat on the floor and in the bottom of the pile the looked-for crate was found. It was further discovered that the crate had arrived on the date it was due, but had been lying on the floor and had been piled over with packages arriving on later trains.

An investigation at once was started to discover why the crate had not been delivered. One of the express unloaders finally furnished the solution of the mystery. He had unloaded the crate from the railroad express car, but it was so heavy and the express company so short of help that it was dumped in the center of the floor and left there. Since then this company is getting much of the same material by express, but is having it handled in smaller and more expensive packages, and is having its own men put the parcels in the car at the shipping end and wait for the arrival of the train at the receiving end. It is not difficult to compute how much money is spent for extra salaries by makers who have to take such precautions not to have their production held up.

In one large factory the vice-president and general manager says to-day he is a purchasing agent and a traffic expert for his company and that with the present scarcity of materials, with the present disorganization of railroads and the general shortage of help, he hopes to continue in that role, perhaps to the end of the war. At present, with those companies that are working at capacity, the neck of the bottle so far as production of motor cars is concerned is the securing of materials. It is not simply securing steel for the frames, castings for the engines or forgings for the transmission or stampings for the chassis, but each and all the thousand little parts without one of which the car cannot leave the factory.

Total Value of Materials

Before looking into the different materials in the car a general survey of materials needed may be in order. If we put the total value of materials needed in a motor car at 100 per cent, we find that steel and iron make up 35 per cent of that total, or, to express it otherwise, more than a third of the total value of all material entering into the average $1000 car consists of steel and iron. The tabulation shows the percentage of other materials by value.

Iron and steel enter into a broad list of car parts, such as all castings for the engine and malleable castings for many chassis parts. Steel in almost a maze of varieties enters into the car in such parts as the frame, which calls for one kind of sheet steel, a different grade of sheet steel for the body and fenders, still another grade of sheet steel for mufflers, underpans, hot air drums, etc. In addition the alloy steel is needed in the springs, which sells at one price; and the alloy steel needed in such parts as crankshafts, camshafts,

connecting rods, piston pins, gears and shafts of the transmission, differential gears, pinions and spiders and also propeller shafts, universal joints, etc.

The price of gray iron in the last eighteen months has increased from $13.35 to $43.00 a ton. This is a price increase of 332 per cent. Take an average $1,000 car and it will use approximately 400 lb. of pig iron. With many the price will go still higher.

With steel, the variety used in frames has increased from $1.35 a hundred pounds to $5.20 in the same period. This represents almost an increase of 400 per cent. In a car of the $1,000 classification, and such a car is referred to hereafter, approximately 150 to 200 lb. of frame steel are required. In purchasing frame steel, which is bought in sheets, the expression "base price" is used. This means a grade of sheet of certain width and thickness. In proportion as a motor car maker wants to use a frame of greater thickness, the base price increases not only in proportion to the thickness but also the stock width.

The second class of sheet steel is that required in bodies and fender sheets, and here the base price has risen from $2.75 to $8.15 per hundred weight. Approximately 200 lb. of such sheet steel is necessary for the body and as much as 175 lb. for the fenders, there being considerable waste in cutting the fenders and this figure allowing for the waste. Several makers are not able to get this body and fender sheet at $8.15 and are paying as much as $11.

Change in Muffler Sheet

The third grade of sheet steel is that known as muffler sheet, which is a lower grade and sells at a lower price. Eighteen months ago muffler sheet sold at $1.80 per hundred weight, and today the price is $5.75, with difficulty in getting future deliveries at such a price. Immediate deliveries are at whatever price you can get the stock. Perhaps 125 lb. of muffler sheet, which is also used for the underpan, are required.

The question of spring steel prices is hard to handle in that it depends on the kind of steel used. There is one price for a high-carbon steel, another for vanadium alloy, a third for silico and other prices for special steels. Perhaps 225 lb. of spring steel are needed for the car, and if this is a high-carbon steel the price in eighteen months has more than doubled, increasing from $2.25 to $5.50 per hundred weight. If it is an alloy steel the increase is practically proportional.

In alloy steels, required for forgings, such as gear blanks, brackets, etc., there is a big loss in material due to the shearing off of excess in the different stages of the forging process, so that the cost of alloy steel in a forging cannot be gaged by the weight of finished forging, because the car manufacturer in purchasing the forging has been charged with this percentage of waste by the forge company. As much as 200 lb. are wasted in such forgings for this car. Such alloy steels for camshafts, crankshafts, connecting rods, piston pins, and gears with one maker has increased from $4.50 to $8 per hundred weight, and with others the prices are considerably higher.

FOURS AND SIXES UNDER $1,000

SIXES

States, C-18	$995
Oakland, 34-B	990
Maibohm, B	975
Saxon, S-4	935

FOURS

Bell	$995
Commonwealth, 4-40	995
Crow-Elkhart, CE-36	995
Monroe, M-6	995
Reo, R	985
Olympian	965
Chevrolet, FA	935
Crow-Elkhart, CE-36	935
Overland, 85-4	930
Geronimo	895
Studebaker, 4	895
Dodge	885
Princess, 4-36	875
Seneca, O	850
Campbell	835
Buick, E-4-35	795
Overland, 90	795
Regal, J	795
Harroun	785
Maxwell, 25	745
Arbenz	725
Briscoe, 4-24	725
Metz, 25	695
Moore, 30	695
Chevrolet, 490	635
Ford, T	360

The use of malleable iron with some manufacturers is quite extensive, as it enters into motor hangers, transmission cases and hangers, spring brackets, differential housing, axle flanges and hubs. Very frequently 200 to 250 lb. of malleable iron in the form of castings are used in a car. The price in eighteen months has nearly doubled, increasing from $4.50 to $8 per hundred.

Next to iron and steel, brass and copper figure in the cost of raw materials, these being placed at 10 per cent of the total cost of a $1,000 car. The brass and copper generally are purchased in bars, and sometimes in sheets. The bar stock is used for water pump parts and gears for same, as well as parts for the oil pump, carbureter, etc. Eighteen months ago the price was 16½ cents a pound and to-day it is 37. It is true the Government has fixed the price on copper, but if you cannot get it at the Government price you must pay a higher figure not to hold up the entire car production of your factory. Thin sheet brass, as used in the radiator, has exactly doubled, increasing from 24½ to 49 cents a pound. At this price it is impossible to get it.

Fabric in the form of duck or upholstering, etc., is a 6 per cent factor in the material cost of the car. Certain grades of colored duck, which is a fabric very generally used, has increased from 8 to 18 cents a yard. The fabric entering into tires not only has increased heavily in price, but there is such a shortage of it that some tire concerns have had to start the cultivation of cotton for this purpose.

Lumber is not a large factor, although constituting 5 per cent of the material outlay. Different grades enter into the car, such as hard maple, used in the body sills, and Southern oak or Northern birch, which is used for floorings. Lumber has not increased so heavily as metals, an increase of from $27.50 to $30 a thousand square feet being an indication of how the market has been in the last eighteen months. There are certain grades of lumber in which the price is much higher.

Leather Up Too

Hand in hand with lumber is leather, which is a 5 per cent material factor. Leather is purchased by the square foot, and the price has risen from approximately 18 to 35 cents per square foot. A $1,000 car will require very nearly 135 sq. ft. of it to care for the cushions and backs of the seats. There are other grades of leather which are much higher in price. Makers of large cars, who require extremely large hides for tonneau upholstery, have had to pay a much greater increase than those makers requiring smaller hides.

Electrical equipment, which means ignition, starting and lighting apparatus, has been bulked by one manufacturer and classed as a material, rather than attempting to analyze the different materials entering into it. Electrical equipment is really a manufactured product, and the increase in price is largely dependent upon the contract of the car maker with the electrical firm, so that it is impossible to give what might be considered standard market prices. There has been a very material increase in these during the last year.

In many other parts of the car increases are practically the same as those cited. For example, glass, which constitutes 2 per cent of the material cost, has doubled in price. Paints, oils, greases and a few other details, which make up 10 per cent of the material cost, have increased 50 per cent in price. Rubber has increased 12 per cent. The price of pneumatic tires has

(*Concluded on page 32*)

PRICE INCREASES IN MATERIALS IN MOTOR CARS IN THE LAST EIGHTEEN MONTHS

	Price was	Price is	Weight unit
Gray iron	$13.35	$43.00	ton
Steel—			
Frames	1.35	5.20	cwt.
Body and fender sheets	2.75	8.15	cwt.
Muffler sheets	1.80	5.75	cwt.
Spring (high-carbon steel)	2.25	5.50	cwt.
Alloy steel—camshafts, crankshafts, connecting rods, piston pins	4.50	8.00	cwt.
Malleable iron	3.95	8.375	cwt.
Brass and copper (bars)	.165	.37	lb.
(thin sheets)	.245	.49	lb.
Glass		(Prices doubled)	
Leather	18-20c	.35	sq. ft.
Paint		Up 50%	
Lumber	27.50	30.00	M. sq. ft.
Fabric (colored duck)	.08	.18	yd.

The Four Winds of Trend Design

Conclusions from Specification Tables

By B. M. Ikert and H. C. Skinner
Motor Age Editorial Staff

THIS is the first time in the history of American motordom that the annual summary of engineering development for the succeeding season has had to start without some big movement to be reported as features of the year's development. It is not to be expected that such will be the case this year, for the engineering ability of motor car designers has been turned for the last nine months to the more immediately important development of such war needs as motor trucks, airplanes and other direct military vehicles. Design of the passenger car, therefore, has been left much in the status quo of twelve months ago.

Important Developments

It is true, however, that there have been several developments which while they are not startling are important from the user's standpoint and are the result of the normal development of the motor car and change in operating conditions. The most important of these developments has been brought about by the gradual reduction in the quality of our motor fuel. This is not a new growth but has been in process during the last several years along with the reduction in fuel quality. Other changes of engineering value which may be considered as 1918 developments are increased efforts for balancing crankshaft, lighter reciprocating parts and thermostatic control of the cooling water.

While there are no basic alterations in engines the fuel question has come in for much attention and the outstanding feature of this year's designs is the numerous ways in which the incoming gases are preheated. To take care of modern fuel, which requires greater absorption of heat to carburete it properly, devices have been introduced, such as hot-spot manifolds, exhaust manifold stoves, hot-water-jacketed inlet manifolds and electrical means for heating raw fuel in the carbureter bowl. Some typical examples of these preheating devices are to be found on the Studebaker, Oakland, Chalmers, Grant, National and Stephens, which have a hot spot in the manifold. Hupmobile not only preheates the air, but the mixture itself by a small lead going from the exhaust pipe directly to the intake manifold. On the Nash the intake manifold is fitted directly under and touching the exhaust manifold. On the Cadillac and Packard the outlet water from the engine passes around the intake manifold, which is maintained at practically a constant temperature by thermostatic control of the cooling water.

Two examples of the electrically heated carbureter bowls are found in the Paige and Franklin, in which the raw fuel is heated by an electric resistance unit placed in the interior of the carbureter float chamber, current being supplied by the storage battery.

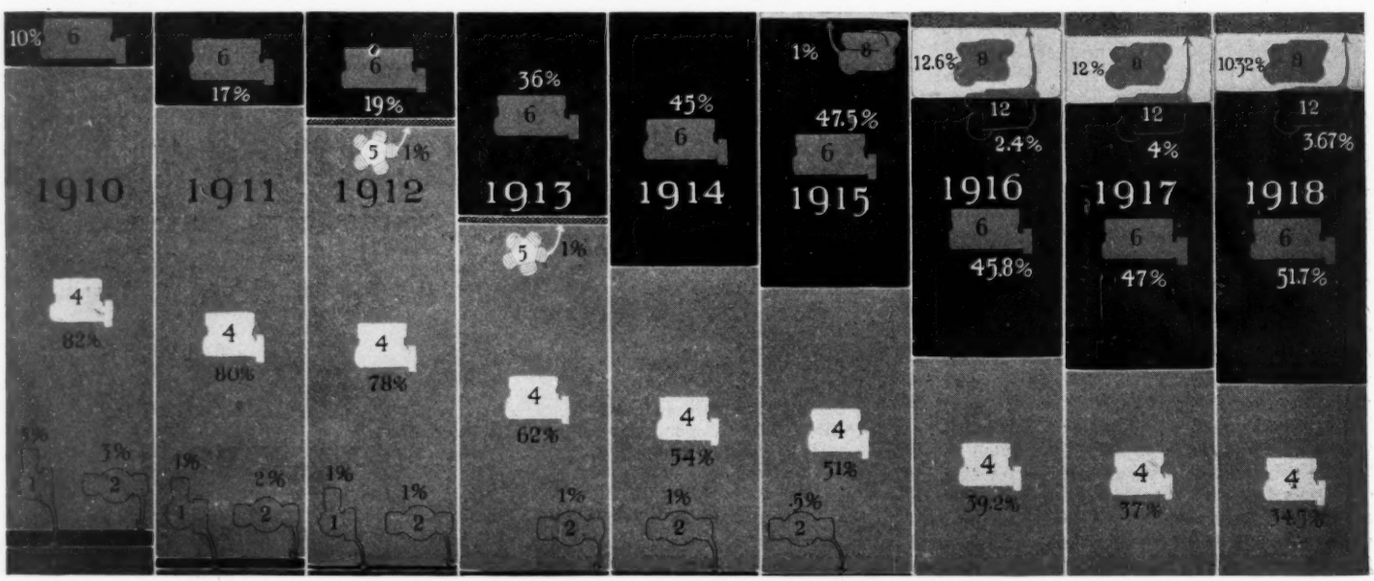
Block castings have offered opportunities to designers which the other forms cannot give. For instance, it is common practice now to cast the inlet manifold integral with the cylinder block, making it possible to connect the carbureter by a very short manifold, consisting in most cases of the carbureter being attached direct to the block with an elbow. This feature also aids materially in reducing condensation in the manifold to a minimum. Thus the incoming gases pass through a heated structure, avoiding greatly the possibility of condensation and, at the same time, absorbing heat from a mass of metal which in some cases acts as a hot spot to assist in handling the heavier grades of fuel.

Remarkable progress has been made toward the elimination of engine vibration. This is a problem which has created more interest in the engineering profession in the last two years than almost any other subject. Reduction of engine vibration, due to the forces set up by the weight of the reciprocating parts, weak and improperly balanced crankshafts and rigidly mounted engines, has resulted in longer engine life and in less noticeable effects to the passenger.

Balance of Crankshafts

In order not to show excessive vibration within the limits of engine speed, a crankshaft must be in both static and dynamic balance. Static balance means that when a crankshaft is mounted on knife edges or in free bearings, it possesses the faculty of remaining at rest in whatever angular position it is placed without regard to the crank throws. In counterweighted or counterbalanced crankshafts—dynamic or running balance means that the centrifugal forces set up by the weight of the crank pin, and in some cases the rotating weight of the connecting rod, are considered—are neutralized by the opposing centrifugal force of the counterweight. The mass of metal composing the counter-weight is either bolted on or integral with the crankshaft cheeks. These are the basic principles upon which crankshafts are balanced.

Specific instances of where crankshaft balance has been given much attention is



Nine years of change in numbers of cylinders as determined by the proportion of chassis models, the sixes, fours, etc.

exemplified by Oldsmobile, Grant, Allen, Apperson, Crow-Elkhart, Kline and Owen-Magnetic. The inertia forces due to the weight of the reciprocating parts have a most important effect upon the life of the engine bearings. Therefore, it is good practice to maintain these weights as low as is consistent with the required factor of safety.

The weight of the piston assembly has been reduced by the use of aluminum alloys and in case of gray iron, by better design. New steels have made possible the design of light weight yet strong connecting rods of almost straight channel section; that is, there is no pronounced taper from the big end to the small end, thus also simplifying their manufacture and making it possible to machine their entire surface more readily.

Reciprocating parts have been lightened on the Dodge Brothers, Cole, Briscoe, Stearns and McFarlan, ranging from lessening the weight of the pistons to that of the valve-operating mechanism.

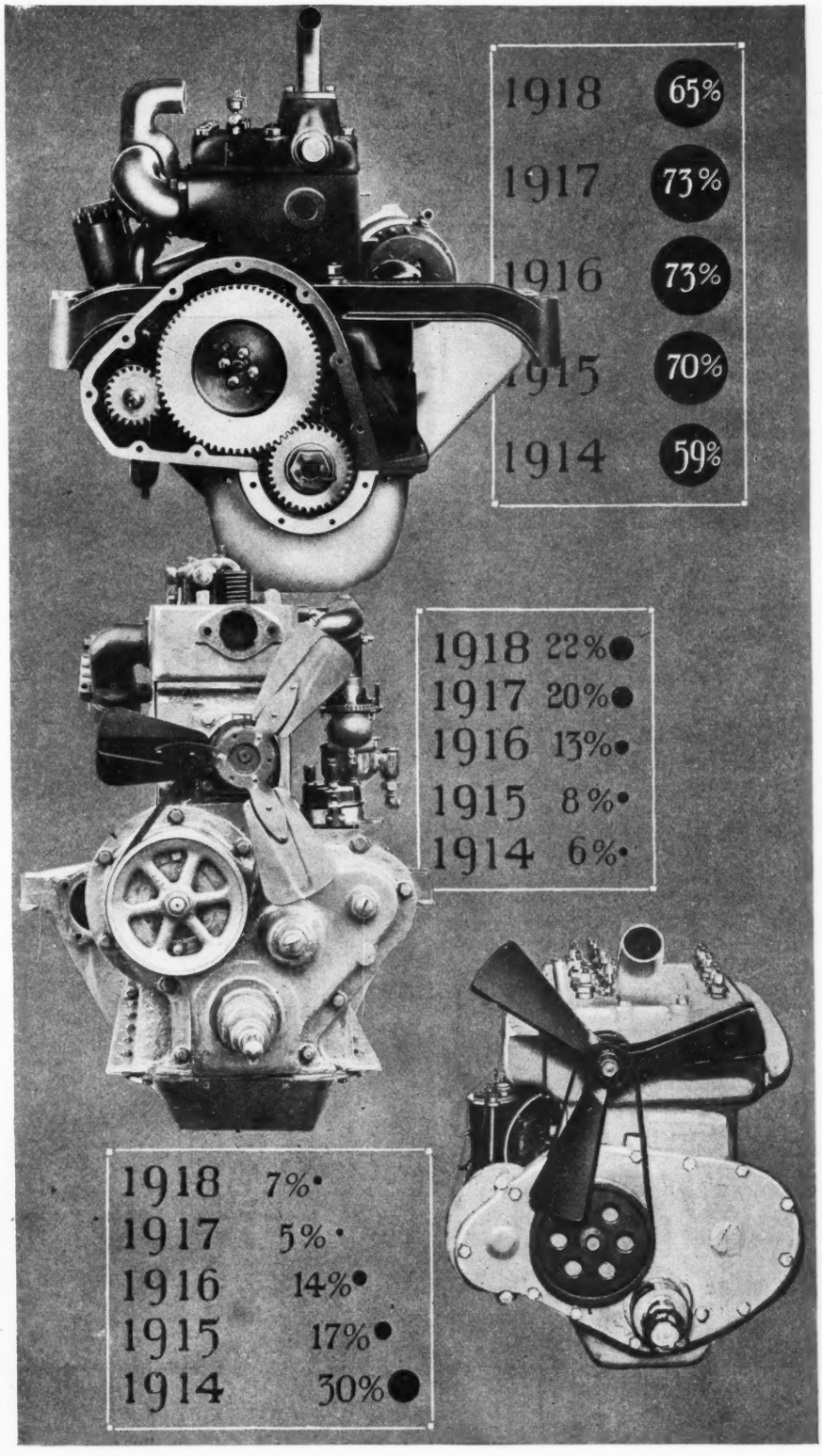
Flexibility in engine mounting is a subject to which much thought is being given. A flexible mounting for the engine demands a thoroughly stressed frame, as in some designs the rear engine arms perform the dual function of supporting the engine and acting as a frame cross member. In such a case there must be flexibility enough to relieve the crankcase of undue strains and not impart any rocking motion to the engine. A notable example of flexible engine mounting is apparent on the Premier, in which the engine hanger straps, both front and rear, are made of Holcomb spring steel and heat treated.

Suspension of Engine

Opinions vary as to rigid frames and four-point support methods compared with flexible frames and three-point engine support. Some users of the three-point suspension method are Ford, Dodge Brothers, Briscoe, Case, Moline-Knight, while the four-point method is favored as design by Chevrolet, Pierce-Arrow, Winton, National and Locomobile.

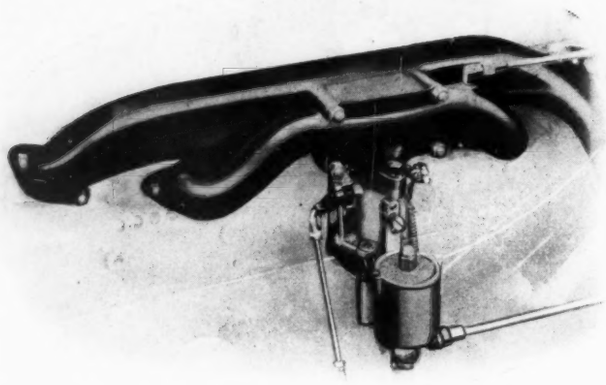
Thermosyphon and pump system of water circulation are about in the same relation to one another as last year, with a slight gain in favor of the forced system. This year several cars control the cooling water temperature by a thermostat, the function of which is to assist in securing better engine performance throughout the entire year. Two methods are employed, one to regulate the amount of water passing through the radiator and the other to control the amount of radiating surface exposed to the air. The latter method is employed to advantage on the Columbia and will be a stock feature of a well-known car whose new model has not as yet been announced. Other concerns who have adopted the thermostatic control this year are Haynes, Westcott, HAL and Owen-Magnetic.

The effect of the thermostat is to maintain an operating temperature of from 135 to 140 deg., insuring, therefore, about the same conditions for the engine in both summer and winter. The airplane, or what should be termed the tractor-type, two-bladed fan is coming into more wide use. In regard to air-cooling, the Franklin remains the only exponent of this system.



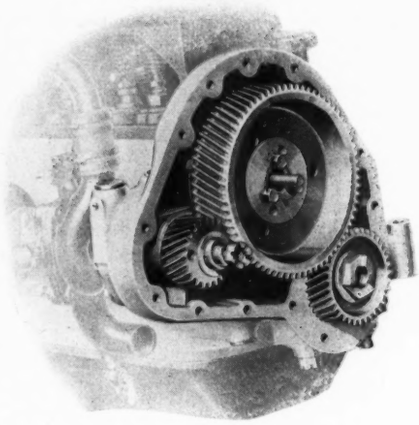
Comparative popularity of the T-head, L-head and valve-in-the-head engines as indicated by the proportion of chassis models during each of the past five years. Note the increase in percentage of the overhead-valve engine, as shown in the center, and a corresponding decrease each year in the T-head, as shown at the bottom. From the upper chart it will be seen that the L-head engine has changed little in this respect

Detachable cylinder heads are in evidence this year more than ever, due to the numerous advantages afforded by such a construction. A detachable head not only makes carbon removal easier but gives the maker a chance to machine the combustion chambers, thus producing an engine with even compression within close limits. Smooth acceleration is partially traceable to this feature on some of the four-cylinder cars. The cars incorporating the fea-



At left, Chalmers hot-spot manifold, showing the ram's horn intake manifold in which the gases are pre-heated by contact with a mass of hot metal

At right, a typical set of helical-cut timing gears for valve-gear drive, which promote quietness of the operation



tures for the first time in their engine design are Cadillac and American.

One of the chief features in connection with the modern engine is the silence of valve-operating mechanism. This is accomplished by the use of helical gears and silent chains for driving the valve gear and by reducing the weight of the reciprocating parts of the valve gear, such as hollow tappets, which in some cases are made of tubing with the working ends brazed in and by the use of light-weight steel valve. For instance, Cole and Apperson have both reduced the weight of the reciprocating parts in the valve gear.

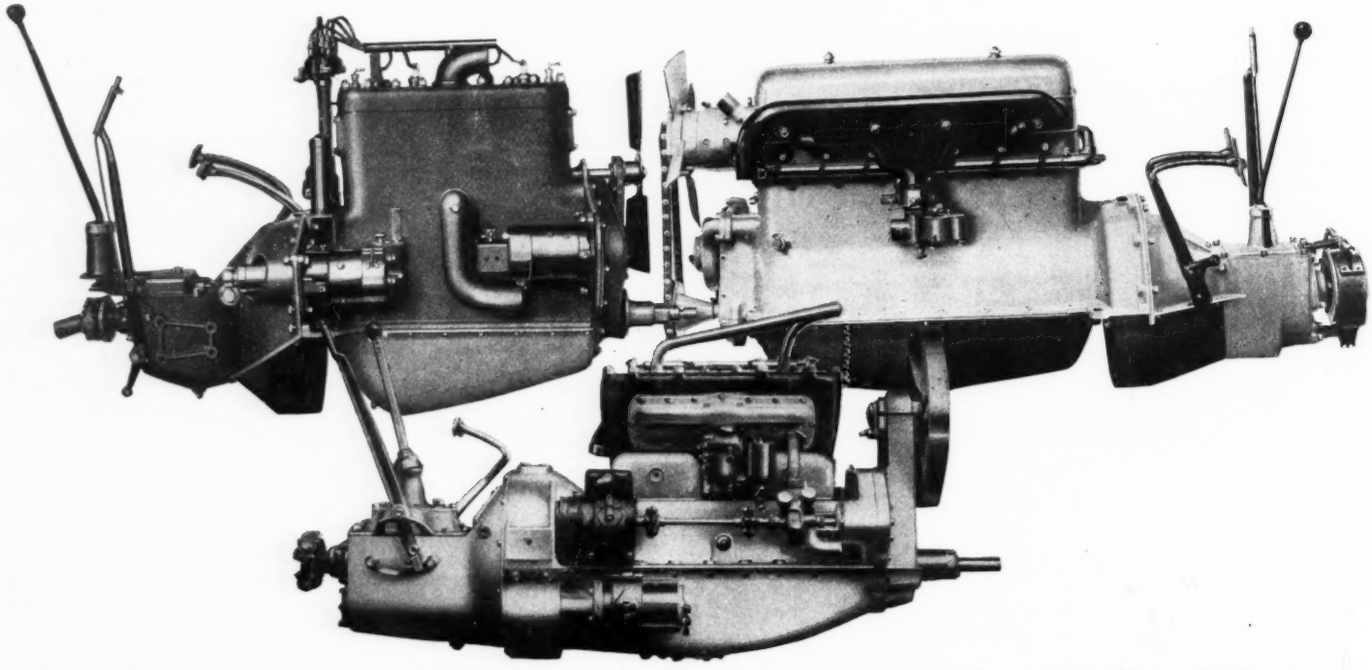
This reduction in weight means a proportional reduction in the inertia forces resulting in more silent operation and better timing characteristic at high engine speeds. The valve-grinding bugbear evidently is in for some jolts, for one make, Paige, has fitted to its valves a polishing scheme, whereby the valves and seats are kept clean by an automatic action. The device is attached to the end of the valve stem and acts between the latter and the tappet. When the valve is lifted the valve spring is compressed, and as it compresses it also turns slightly in an attempt to wind up to resist the compression. As the valve comes back to its seat the compression on the spring is released and the springs tend to unwind. The adjustable spacer takes advantage of this and turns the valve slightly at each stroke, causing the valve to make contact at new points on the seat.

The usual valve pocket characteristic of the L-head engine has been reduced to a minimum by Oldsmobile and McFarlan by the use of inclined or canted valves, which means that instead of having the valves parallel to the cylinder bore, the valves are inclined so that the post is located closer to the cylinder bore, necessitating moving the camshaft outward to maintain the lifting mechanism in a straight line. The prime motive of canting the valves is to give more freedom to the passage of the gases.

Cause of Popularity

There is nothing strange about the valve-in-the-head engine when one seeks the cause for its gaining popularity. Its inherent construction, provided, of course, that it is properly designed, permits of better power characteristics on account of its well-shaped combustion chamber and good volumetric efficiency—by which is meant the ratio of the volume of gas induced into the cylinder to the total volume of the cylinder. The overhead location of the valves in this construction permits better ingress and egress of the gases. Closely allied to the I-head type is the horizontal-valve-in-the-head engine, notably the Duesenberg, which after several seasons of confinement to racing cars now is adopted as stock on the Roamer and Wolverine.

While the two remaining poppet-valve types of cylinder castings, L-head and T-head, are still in vogue, the in-block L-head, although leading, does not maintain its position of last year but has given ground to the I-head type. The T-head engine shows a slight increase in its use, but this is accounted for by the fact that there are a less number of makes, which automatically increases the percentage of the T-head. It is also attributed to the use of the sixteen-valve engine, which with demountable heads necessitates T-head construction having the inlet valves on one side and exhaust on the opposite. The



Group of three engines giving a good idea of the tendencies to make the modern engine a clean-cut job. Upper left shows the new Hupmobile, while to the right of it is the Nash. Below is the sixteen-valve White engine. These three are good examples of clean exteriors, good manifolding and accessibility

sixteen-valve engine was introduced on stock cars in 1916 by both Stutz and White.

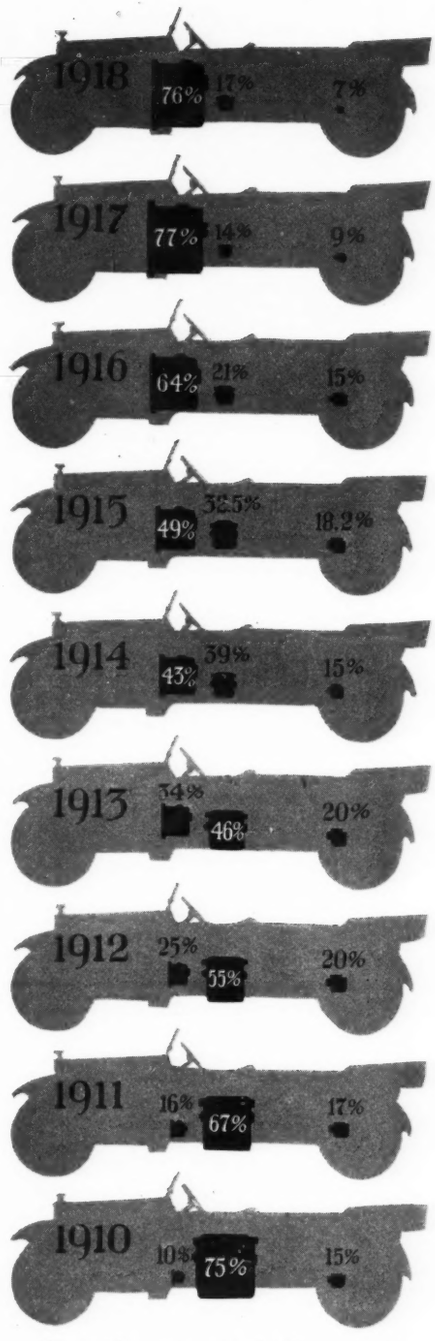
The Knight sleeve-valve engine holds the same position as it did last year, being used on four cars, the Willys, Stearns, Moline and Brewster. The engine, so far as its essentials are concerned, is unchanged, but some of its users have made refinements. Stearns, for instance, has lightened reciprocating parts and machines the entire connecting rod. Moline has a lubricating system whereby the oil pressure varies in direct proportion to the engine speed, eliminating the former method of raising the oil troughs simultaneously with opening the throttle.

The modern type of engine has been evolved into a clean-cut structure, in which accessibility, simplicity and remarkable power range are manifest. Combined with these features are ease and quantity production, due to the standardization of parts. There are less studs and bolts used, and those that are necessary have been, so far as possible, made to a given size in many cases. This means that the engine is easier to take down, when necessary, for it eliminates the use of various sized wrenches to fit various sized bolt heads.

Exterior of Engine Improved

Refinement in design has improved the external appearance of the modern engine to such an extent that its graceful lines cannot help but appeal even to the eyes of persons unskilled in art. To-day's engines are tailor-made, if the phrase is permissible; fitting running mates for the high-class coach work exemplified in modern custom-built motor car bodies. Many of the engines now have a smooth enameled exterior, with nicely molded parts, while a few years ago, it sufficed to offer engines made up of rough castings cluttered up with a multiplicity of parts.

For the last five years the disk clutch has been gaining steadily at the expense of the cone until now it has a commanding lead. The disk clutch is used on about three-fourths of the various chassis makes and the cone on the remaining fourth. Various types of the disk clutch are in vogue, the more prominent of which are the single-plate dry-disk, the multiple-plate dry-disk and the multiple-plate type running in oil bath. Inclinations seem to be in favor of the dry-plate type, as, for example, Allen and Case have adopted it on their new cars. Some improvements noted in the cone clutch is the use of an aluminum spider, reducing the weight of the assembly and facilitating gearshifting. Owing to the decrease in weight the clutch has less tendency to act as flywheel and permits more rapid changing of gears. In both types better provision for lubrication has been made. So far as gearset location is concerned, the in-unit-with-engine position is used on about three-fourths of the makes. Next comes the amidships location, while there are several makers who combine the gearset in unit with the rear axle. Notable examples of the latter method are Willys-Overland, Saxon, Briscoe, Stutz and Moon. On the Mitchell, Marmon and the Brewster the gearset is mounted in unit with the torque tube forward end. The magnetic form of transmission shows a slight increase in its use. Instead of being confined to one car only, the Owen-Magnetic, it is used in the makeup of the new Deering-Magnetic car.



Forward progress of the gearset from the amidships position to the in-unit-with-the-engine as indicated by the proportion of chassis models in this position each year

There is a tendency this year for makers to fit transmission locks which are in reality components parts of the gearset. With these locks it is impossible to move the change speed hand lever in any position, thus affording ready insurance against theft.

There has been no appreciable change in the electric system in so far as its general application to motor cars is concerned. According to the dictates of the modern chassis, the two unit-electric system holds sway. In this system the starting motor and generator are two distinct electrical machines, the former being generally on the flywheel housing for direct engagement with the flywheel. The generator is driven from the valve gear drive, being located in the majority of instances in the pump shaft line. Such an installation has the advantage that if either the starting motor or generator does not function properly, it will not have a direct bearing on the action of the other unit. Of all of the makes of cars, 99 per cent of them are equipped with electric starting and lighting systems. About 85 per cent of the cars use the two-unit system.

Almost 90 per cent of the electric systems are of the single-wire, or grounded-return, type, which indicates that designers are continuing their efforts toward simplification of the electrical equipment. Packard, for instance, now uses the single-wire system. Standardization is playing an important part here also, for there is a decided tendency to use the 6-volt system. In fact, about 90 per cent of the chassis makes are now furnished with 6-volt systems.

Battery Ignition Most Popular

Of the 125 different makes of cars three-fourths are equipped with battery ignition and the remaining with magneto. Single ignition, that is, a system in which one set of spark plugs derives its electrical energy from one source which may be a battery or magneto, is used on 90 per cent of the different makes. The battery ignition system is a strong favorite with the designers of multiple-cylinder engines. For instance, the National uses the battery system on its twelve-cylinder product, while a high-tension magneto is used on the six-cylinder chassis. Other users of the battery system making cars powered with multiple-cylinder engines are Cadillac, Packard, Cole, Kissel and Peerless, while Chandler, Pierce-Arrow, Marmon, Locomobile, Winton and Crane-Simplex use magneto ignition on their six-cylinder cars. The battery and magneto systems are both in favor on the moderate-priced car, the former, however, being more extensively used.

with multiple-cylinder engines are Cadil-

There still seems to be no standard location for the storage battery, for it is hung in almost every conceivable position on the chassis, varying from the running board to some inaccessible position under the body. The psychological effect is to neglect the battery, for it is characteristic of owners to neglect parts which are placed in inaccessible positions. Perhaps standardization of the size of batteries would tend to relieve the situation, as practically every designer has a different idea as to the size and location of a battery.

The clean-cut chassis apparent in so many of the makes is due to a large extent to the use of Hotchkiss drive, which by virtue of its principle of operation eliminates radius rods and torque arm. This form of drive is used on more than half of the makes, and those who have adopted it this year are Packard, Oakland, Allen, Case, Elcar and Owen-Magnetic. To overcome the tendency of torque to turn the entire axle about its own center, heavy leaf, semi-elliptic rear springs are used,

rigidly attached to the rear axle housing. In cases where a torque arm is used, the latter customarily is attached to the rear axle housing by a vertical hinge which allows horizontal movement and is fulcrumed to a forward frame cross member by a ball and socket spring construction.

In more than three-fourths of the chassis makes, spiral-bevel drive is employed, the advantages of which are quietness and less power loss. The straight bevel gear is used in about a sixth of the cars, while the Woods Dual Power is the only advocate of the worm drive.

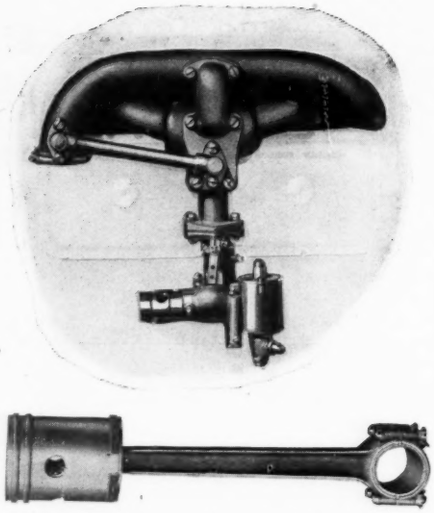
American chassis use three types of rear axles, full-floating, three-quarter floating and semi-floating, which are favored in the order named. The full-floating rear axle's lead is probably due to its slightly better accessibility. In rear axle construction it is important to reduce the unsprung weight as much as possible and yet not sacrifice the strength of the assembly.

There is an increasing tendency to lessen the arch of rear springs, so that they will be practically flat under load. This has been carried out in various manners by Cole, Locomobile, Kline and Glide.

Although specifications do not indicate any radical changes in frame design, the subject has been given considerable thought by designers, with the result that frames have been made slightly deeper. While some manufacturers have added from ¼ to ½ in. to the frame channel, the increase is not sufficient to warrant redesigning frame brackets, engine arms, etc. However, it appears as if future designs will embody frames patterned much after the type now used by Marmon and Premier. A deep section frame possesses certain advantages. For instance, it can be made of lighter stock, and yet stronger than many frames of less depth, made of heavier stock.

Replacing Grease Cups

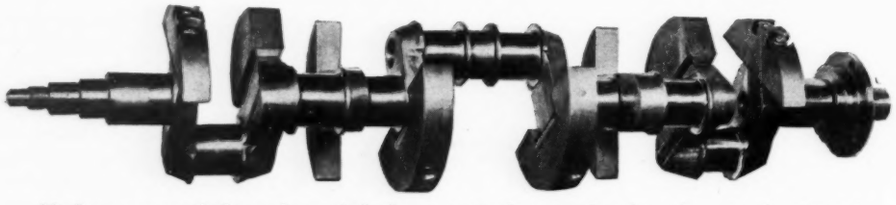
The last season has seen much agitation for oil cups, wells and wicks in place of grease cups on the chassis. These are more satisfactory from the owner-driver's standpoint than grease cups, as they make for ease of maintenance. In this respect, however, there still remains a great field for improvement. The ultra in chassis lubrication was introduced several years ago by the Fergus. Chassis oiling is one of the features of the Marmon 34, in which the well system is used. Chassis lubrication is a matter of great import, if this part of the car is to be kept on a par with the other excellently designed features such as engine lubrication. Neglect of chassis lubrication by owners is responsible for much rapid deterioration of motor cars. Simplification of chassis lubrication has been carried out on the Cadillac, Grant, Kissel, Apperson, Westcott, Moline, HAL and KlineKar. In the above cases the extent of refinement consisted of replacing grease cups with oil cups, or installing self-lubricating bushings on the brake shafts and spring shackles.



Piston and connecting rod assembly of the Mercer, a comparatively straight type of lightweight rod. Above, the pre-heating device on the new Hupmobile, showing the pipe which heats the mixture. The air is heated by a pipe, not shown, going from carbureter to the exhaust

By integrating the tendencies in the design of mechanical features in the motor car of the present season, it is a surprise to note that the composite chassis, representing the average of one-hundred and eighty chassis of one-hundred and twenty-five manufacturers, is somewhat larger than that of the previous season. For example the wheelbase of what we might term the average American car is now 120 in., 7 in. greater than its predecessor of last year. Naturally we should look for an increase in power of such a car in order to secure the same car activity demanded by the buying public. To secure more power means that the cubic contents of the engine cylinders must be increased, either by an increase in bore and stroke, or adding more cylinders. Apparently the former method has been chosen, for this year's average engine size is 3.43 in. bore by 4.94 in. stroke, as compared with last year's average engine specifications, which were 3.37 in. bore and 4.66 in. stroke. To cite a specific instance, Buick, for example, has increased its engine in one model from 3¼ in. by 4½ in. to 3⅜ in. by 4½ in. Then there is Chandler, which has gone from 3⅜ in. by 5 in. to 3½ in. by 5. It also holds true of cars in the high-price field for Fiat has changed its engine size from 5⅛ in. by 6¾ in. to 5¼ in. by 6¾. Likewise the Owen-Magnetic has increased the bore from 3¾ in. to 4 in., while the stroke remains the same, 5½ in.

Gear ratios have not changed materially, and the average is practically the same as the previous year, but with the increase in engine power, it means a higher final car speed and better general car performance.



Hudson counterbalanced crankshaft—a typical example of modern tendencies of crankshaft design. The counter weights are not made integral with the shaft in this case but attached with steel studs

S. A. E. WINTER PROGRAM COMPLE

New York, Dec. 28—The program for the annual meeting of the Society of Automotive Engineers to be held here Thursday, Jan. 10, has been completed. All of the papers and addresses have been under preparation for nearly two months. To date 797 tickets for the annual dinner to be held at Hotel Biltmore Thursday evening, have been sold. The capacity of the hotel will be exhausted more than a week in advance of the dinner.

The complete program for Thursday afternoon, Jan. 10, follows:

1. "The Reasons Behind the Liberty Engine," Major J. G. Vincent, followed by special discussion by Colonel Clark, Capt. Howard Marmon and H. M. Crane of the Wright-Martin Co.

2. "The Reasons Behind the War Truck." This will be handled by five different men, one handling the engine, another the transmission, another the general chassis, a fourth the axles, and a fifth the engine tests. These are: Engines, A. F. Milbrath; Transmission, A. W. Copland; Axle Design, G. W. Carlson; General Chassis, C. T. Myers; Engine Tests, Capt. W. M. Britton.

3. "Fuels for Automotive Apparatus," Dr. E. W. Dean.

4. In addition there will be several papers which will be printed for circulation among the members.

The dinner will be entirely military in its character. The following speakers will be present: General Chauncy B. Baker of the Quartermaster's Department in charge of transportation, who has been the moving spirit back of the standardized war trucks; Dr. J. D. Cormac of the British mission on aeronautics, who has been in this country for several months, who will represent aviation interests on the program; Howard E. Coffin, chairman of the Aircraft Production Board; and John Kendrick Bangs, the latter acting as toastmaster.

MOTORIZED MAIL ROUTES

Louisville, Ky., Dec. 29—A motor mail route will be established between Cave City, Ky., and Louisville. It previously has been announced from Indianapolis that a similar route from Louisville to Indianapolis would be established. This plan is being tried out by the Government to enable farmers to market their perishable and other products. If these routes prove successful the system probably will become universal throughout the country. By Feb. 14 the routes will be ready for business.

From Louisville to Cave City is a distance of 88.8 miles. Cars will leave Louisville and Cave City at 5 o'clock each morning except Sunday and will reach the other city by 2 o'clock in the afternoon. The Dixie highway will be followed.

To Standardize Repair Base Units

Quartermaster Corps Will Simplify Work in France by Similarity of Buildings and Tools

WASHINGTON, Dec. 29—In line with the general plan of standardization pursued by the transportation division of the Quartermaster Corps under direction of General Chauncey B. Baker comes the new plan of standardization of repair base units for service at home and abroad, by which there will be standardized repair shop buildings, standardized corps of mechanics, standardized systems for repair and standardized repair equipment.

Following beginning of production of the class B heavy-duty war trucks and completion of designs of the A and AA sizes, the Military Truck Production Board started on its work for the maintenance of the trucks in France. George C. Randles, in charge of the manufacturing equipment, with James F. Bourquin, head of the production work, made a thorough investigation of truck repair on the Mexican border, learning the achievements and the errors of the past. They found some shops excellent, others not so good, with the chief problem that of the inefficient soldier-mechanic, soldier-foreman and soldier-superintendent, who were found among the many soldier-mechanics, foremen and superintendents at work. Many repair jobs were found to be wrongly handled because of ignorance, others because of different opinions between mechanics and still others because of inferior machinery, tools and so on. The result was the decision to standardize insofar as possible.

All Buildings Alike

The repair base units themselves have been planned on standardized lines. Each average building will have 230,000 square feet of floor space. All buildings will be exactly alike with stock rooms, tool rooms, racks and so on the same in each. The general plans for these buildings are so arranged that in event the building should be made larger or smaller, the change in the plans can be made within a very few minutes by adding or taking away the number of bays required, without affecting the efficiency of the plant. These plans also include consideration of light, heat and power which can be increased or decreased at will along similar lines.

The value of this plan lies in the fact that where workers are taken from one plant to another they can at once enter upon their duties without strangeness, knowing where to find stock, accustomed to the tool racks, used to certain methods which can be pursued equally well in the new shop. For example, the Quartermasters Corps is building a huge mechanical repair shop unit at Baltimore, where thousands of mechanics will work on the trucks coming overland from the factories to the seaboard. Construction of this plant and also of the warehouse which will adjoin it and serve as commissary to the trucks began this last week. Completion is expected in ninety days. If after these mechanics have been thoroughly trained at the truck repair work in this shop, the War Department decides to send them to France, it will be a simple matter. The men can be transferred readily and when they enter the shop in France will find the stock rooms, tools, machinery, light, power, laboratories, everything exactly as in Baltimore.

The next standardizing step is that of rebuilding and repairing. There are certain fundamental principles of mechanics for this work, and the plan provides a system that insures that each mechanic will follow the proper methods. A book to be known as the Shop Manual is being compiled, which definitely lays down the rules to be followed for repairs. The plan insures uniform work at every base and on every job. Instead of depending upon the foreman to say, for example, that a cylinder is not in need of regrinding, the workers will turn to their manual which strictly defines the cylinders that are out of round or tapered beyond good practice and definitely specifies the regrinding and the oversize, which also is standardized. This same applies to the crankshaft where, if the pins are egg-shaped all must be ground down to a certain under size to clean up properly. In this way every job must be done thoroughly and there will be no opportunity for men to use individual judgment or to experiment at a time when experiment may mean a penalty of lives.

All tools and machines are being standardized insofar as this is consistently possible with good judgment. All machine tools are standard belt-driven, because belt-driven machine tools are easier to get than motor-driven, because there is always possible the conflict of alternating and direct currents and of different voltages in the use of the motor-driven, and because with a line shaft drive, if emergency demanded, a gasoline engine could be attached and used efficiently.

All mechanic's tool kits will be standardized, each mechanic of the different classes carrying identical tools, which will be subjected once a week to military inspection much the same as with the arms of the infantry soldier. This inspection will apply particularly to the finer tools which have to be almost perfect to insure efficient results.

Thus between the standardized shops, machines, tools and repair instructions of the Shop Manual every truck entering the shop for repair will proceed through exactly the same movements from entrance to exit that every other truck in its class will pass.

The standardization extends also to the mobile repair units the trucks carrying small repair shops aboard for making field repairs. These will carry standardized repair tools and machinery and plans are now being made to perfect every detail of the repair mechanism to the highest degree. For example, a large drilling machine in the original equipment has been eliminated and a small drilling attachment substituted that is more efficient, and the original lathes standing on two legs which were unable to withstand the shocks over the roads and usually resulted in lathes out of line, have been changed so they rest on a center pedestal over a cabinet, insuring firmness of position.

The average base repair unit is expected to hold 1163 men under direction of a major. The plan of organization of this general scheme of maintenance includes:

Supervision of standardization by George E. Randles, whose duties include provision for standardizing all buildings, power plants, stock rooms, warehouses, lighting, heating, plant transportation, manufacturing equipment and methods, with various details connected with modern plants and manufacturing practices for the work to be performed, and the compiling of all data necessary. He is being assisted by:

F. A. Barnes, industrial engineer of Cleveland, Ohio, whose duties include building design, building construction, cranes, power plants, water, heating, lighting and sewage.

To Work on Details

D. C. Selheimer, production engineer formerly with the Packard Motor Car Co. and the Hal Motor Co., who is working out the details of all manufacturing equipment, such as machine tools, small tools mechanics' tools, shop transportation, arrangement of departments and manufacturing lay-out details. He will be assisted by Lieutenant Rogers.

Major North, who will provide complete plans and specifications for recommendations for procurement of various items, follow up purchases and maintain purchasing records.

Lieutenant Lord, who will work out the shop manual of standardized operations, with parts lists and instruction books of the class AA, A and B trucks.

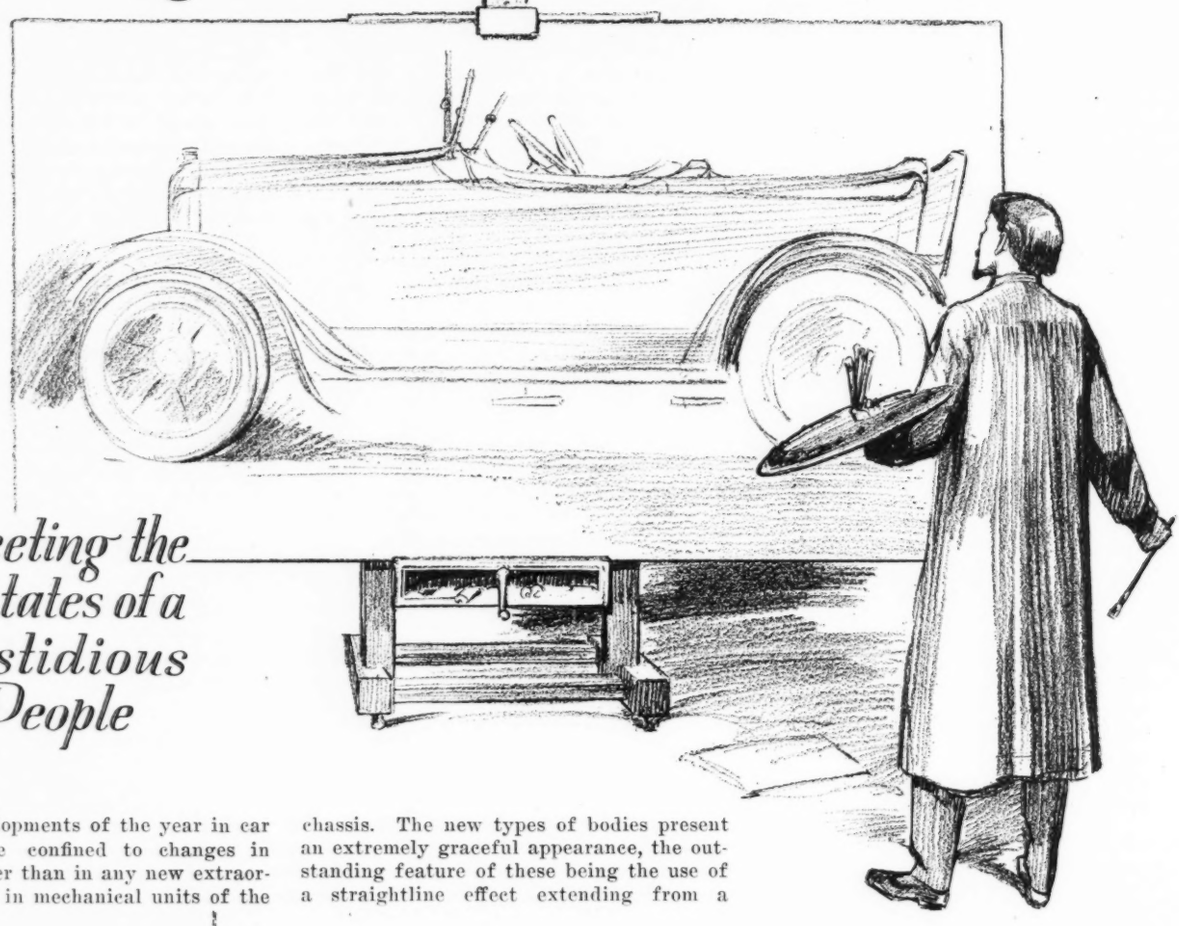
B. H. Eaton, who is arranging details of plant systems, including tool cribs, warehouses, receiving, stock room and shipping.

Major Parramore, an army officer who will act in a consulting capacity. Major Parramore has seen active truck repair service on the Mexican border.

There will also be an additional department of employment to handle the induction of mechanics and the enlistment of those over the draft age.

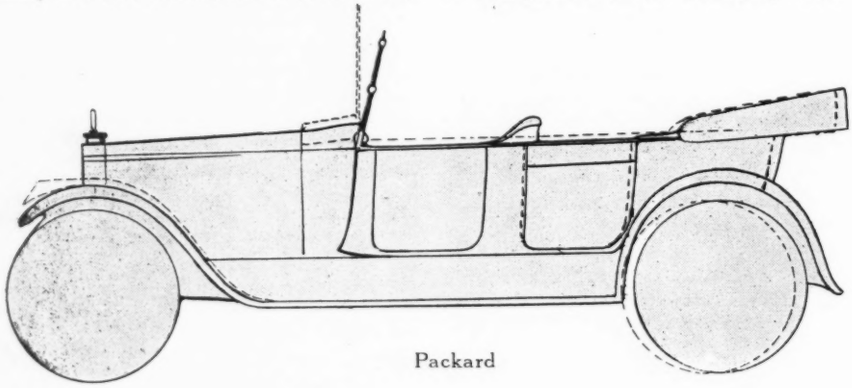
All of this work enters into the regular duties of the Military Truck Production Board which has had charge of production and maintenance and which now includes in its supervision, under Christian Girl, chairman, the direction of the engineering designs for all Quartermaster engineering work.

Solving the Eternal Riddle

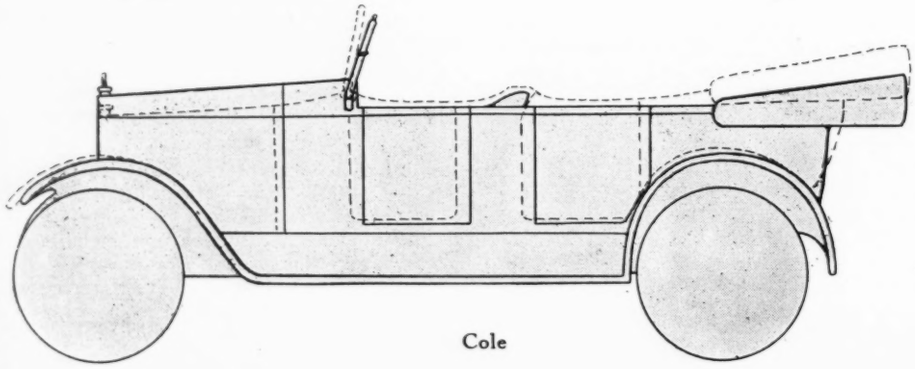


Meeting the Dictates of a Fastidious People

CHIEF developments of the year in car design are confined to changes in body lines rather than in any new extraordinary features in mechanical units of the chassis. The new types of bodies present an extremely graceful appearance, the outstanding feature of these being the use of a straightline effect extending from a rather high radiator to the rear. The straightline effect, although it was in vogue last year to some extent, has in the new designs been made more pronounced by the use of the keen bevel-edged type of open body.



Packard



Cole

Business conditions have made it necessary for manufacturers to avoid changing the mechanical construction of their cars on account of the material situation, the expense involved in re-tooling the factory and re-educating the employees to the new manufacturing methods that would necessarily follow such a step. Consequently, we find that the manufacturer has concentrated his attention chiefly upon changing the exterior appearance of his car and also incorporating such features in the construction of new bodies that would afford more comfort for the passengers.

The cardinal points of the modern body include a high straightline body and cowl, which gracefully blends itself into the lines of the body proper. The streamline effect further is accentuated by the adoption of sloping windshields having a more rakish tilt than ever before, which harmonizes with the whole design in a better way. This form of windshield increases the driver's range of vision and also re-

duces the wind resistance, which becomes a considerable factor at high speeds. It eliminates the pressure pocket that is formed due to the straight windshield, carrying the air back over the top. In connection with this, top designs also have been improved and now have a flatter quarter line and thus harmonize with the streamline design as a whole.

The two forms of streamline bodies most in evidence are the double-cowl and straight sideline type. Either of these types of bodies adapt themselves well to convex side lines which tend to promote graceful lines and also afford the designer exceptional opportunities to produce a comfortable seating arrangement of the passengers.

In this respect the new bodies are superior so far as the comforts of motoring are concerned, as by the use of pleated upholstery and new forms of cushion suspension, the riding qualities of the American car is now excellent. This condition, of course, can be attributed partially to the buying public's demand for better appointments in body equipment.

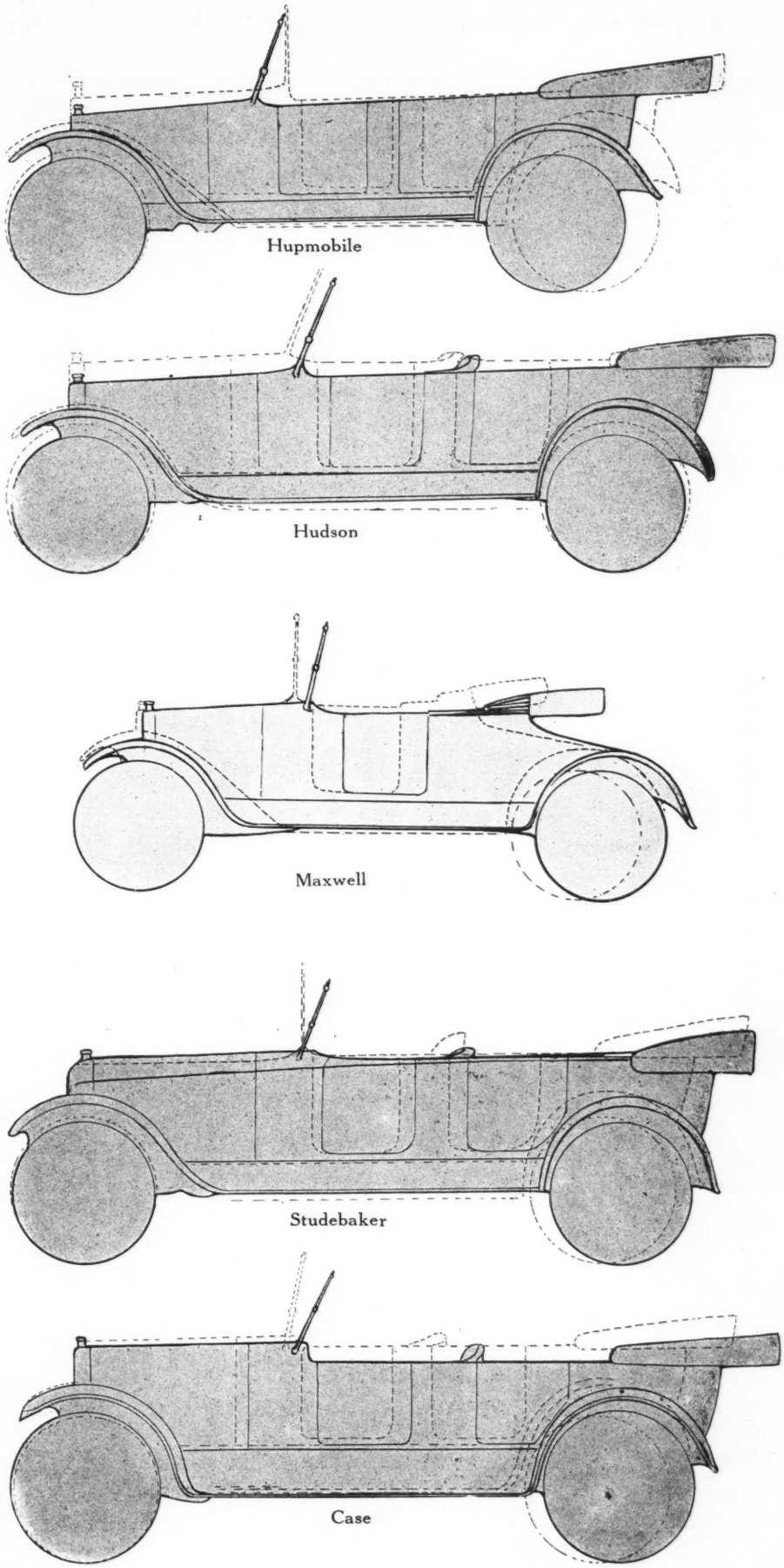
Smooth Exterior

The smooth exterior of the new bodies has been made possible by better manufacturing methods, in which the metal comprising the body shape either is a stamping or made up of individual stampings spot-welded together, thus eliminating seams which in former years have broken up the unity of design.

Body design is an art which has advanced rapidly in the last few years, and in a case of the streamline body, a new problem has arisen in which the monotony of the design as a whole must be relieved in some manner. This is accomplished by various means, some by color combinations, and then, in case of a solid colored body, relief is afforded by the use of door handles or some other useful contrivance. These little fitments function as accents to give distinctiveness to a certain class of bodies. This is exemplified by many of the well-known makers who have for years retained certain little elements of exclusiveness in their bodies regardless of how radically they may have changed the lines of their product.

A glance at the various forms of body shapes shown in the illustrations which represent this year's designs superimposed upon those of last year, indicated by the dotted lines, shows that the tendency throughout the industry is to conform to the streamline types and generally speaking, to lower the body as a whole. The latter trend, together with the long overhanging rear-spring suspension, produces to the eye the effect of a long wheelbase, while in reality this may not be the case.

Running board design has been improved in some instances by the elimination of running board shields. This has been accomplished in designs where exceptionally deep channels are used in the frame construction, thus permitting the running board to be mounted snugly up against the frame. This also permits better fender designs, and graceful curves take the place of angles at the junction of fender and running board.



Last year's designs on these two pages are indicated by the dotted lines, while this year's are superimposed on the old

Contrast of Average American Cars for 9 Years

GENERAL AVERAGES

	1918	1917	1916	1915	1914	1913	1912	1911	1910
Horsepower, N.AC.C. rating..	27.4	24.3	28.66	29.97	33.2	33.60	33.60	32.7	31.5
Bore	3.43	3.37	3.57	3.82	4.12	4.19	4.34	4.42	4.55
Stroke	4.94	4.66	4.97	5.10	5.28	5.15	4.97	4.46	4.68
Stroke-bore ratio	1.25	1.38	1.39	1.33	1.28-1	1.23-1	1.09-1	1.01-1	1.03-1
Piston displacement	269	222.5	278.87	307.38	349	345	316.2	313.2	281.5
Wheelbase	120.7	113.25	119.56	122.19	121	122	121	114	112
Gear ratio	4.22-1	4.15-1	4.08-1	3.88-1	3.6-1	3.57-1	3.62-1	....	....
Tires	34x4	34x3⅞	33x4½	34x4	35x4½	35x4½	35x4	34x4	34x4
Number cars	650	644	519	535	607	....	....	....	....
Number chassis	180	194	176	200	236	339	381	393	364
Number makes	125	138	108	119	133	156	193	270	239
Price	$1822	$1687	$1600	$2005	$2635	$2585	$2508	$2560	$2214

PERCENTAGE

Number of Cylinders									
One cylinder	0	0	0	0	0	0	1	1	5
Two cylinders	0	0	0	5	1	1	1	2	3
Four cylinders	34.5	37	39.2	51.0	54	62	78	80	82
Five cylinders	0	0	0	0	0	1	1	0	0
Six cylinders	51.7	47	45.8	47.5	45	36	19	17	10
Eight cylinders	10.2	12	12.6	1.0	0	0	0	0	0
Twelve cylinders	3.6	4	2.4	0	0	0	0	0	0
Shape of Cylinders									
T-cylinder type	6.8	5	13.7	16.5	30	31	30	22	20
L-cylinder shape	63.5	73	73.3	70.0	59	56	55	60	56
I-cylinder type	22.2	20	13.0	8.5	6	9	9	14	18
Knight type	4.0	2	3.6	3.0	3	3	2	1	0
Horizontal valve	2.3	....	....	....	....	....	....	....	....
F head	1.2	....	....	....	....	....	....	....	....
Two-cycle	0	0	0	1.0	1	1	4	3	6
Mondex-Magic type	0	0	0	0	1	0	0	0	0
Cylinder Arrangement									
Cylinders cast separate	....	1	4.8	4.0	6	15	22	28	39
Cylinders cast in pairs	....	5	10.2	27.0	42	48	58	60	53
Cylinders cast in block	....	87	78.4	67.5	39	29	18	12	8
Cylinders cast in threes	....	7	6.6	10.5	13	8	2	0	0
Cooling									
Air-cooled	0.5	....	.6	.5	2	4	5	6	7
Thermo-syphon	32.5	38	38.2	27	19	17	19	28	23
Pump circulating	67.0	62	61.2	72.5	79	79	76	66	70
Ignition Systems									
Single ignition	91.0	84	76.0	56	23	15	14	18	25
Dual ignition	2.1	9	19.2	36	59	68	63	53	40
Two-spark ignition	1.1	1	1.2	1.45	4	2	0	0	0
Double ignition	3.5	3	1.8	4.55	11	15	23	29	35
Duplex ignition	.6	1	1.8	2.0	3	0	0	0	0
Dual-double	1.7	2	....	....	....	....	....	....	....
Motor Lubrication									
Splash oiling	.6	35	52.7	46.5	42	53	68	81	0
Splash pressure oiling	43.2	35	23.35	16	39	32	20	0	0
Circulating splash	28.4	0	0	0	0	0	0	0	0
Oil in fuel	0	0	....	0	1	1	2	3	6
Pressure oiling	26.7	30	23.35	37.5	18	14	10	19	0
Splash gravity	1.1	....	.6	0	0	0	0	0	0
Engine Starting									
Electric starter	99	99	98.8	94.5	87	37	2	0	0
Acetylene starter	0	0	0	0	1	14	0	0	0
Air starter	0	0	0	0	4	9	2	1	1
Optional starter	0	0	0	1.5	2	5	0	0	0
Mechanical starter	0	0	0	.5	1	4	0	0	0
No starter as stock	1	1	1.2	3.5	5	31	98	99	99
Fuel Feed									
Gravity fuel feed	9.7	18	31.8	57	58	65	75	81	82
Gravity-pressure fuel feed	0	1	2.4	.5	1	0	0	0	0
Pressure fuel feed	6.8	7	12.0	22	41	35	25	19	18
Vacuum feed	83.5	74	53.8	20.5	0	0	0	0	0
Type of Clutch									
Disk clutch	72.4	68	53.4	51	48	52	44	51	49
Cone clutch	25.9	30	45.6	44	41	45	52	47	39
Expanding band clutch	0	0	0	.5	3	1	3	2	6
Contracting band clutch	0	0	0	4.5	5	2	1	1	3
None	.5	1	....	....	3	....	....	....	....
Electric	1.2	1	1	0	0	0	0	0	0
Location of Gearset									
Amidship, selective	17.4	13.5	20.5	31.5	39	45	54	66	74
Unit with axle, selective	7.1	9	14.0	18.2	15	20	20	17	14
Unit with motor, selective	71.0	77	63.1	49.3	42	34	25	16	9
Unit with torque tube, selective	2.0	0	....	....	....	....	....	....	....
None	....	....	....	....	3	....	....	....	....
Planetary	.5	.5	.5	1.0	1	1	2	4	4
Magnetic	2.0	....	2	....	....	....	....	....	....
Wheels									
Wire wheels—demountable	11.4	10	6.5	7.0	4	3	0	0	0
Wood wheels	72.2	79	82.5	88.5	96	96	100	100	100
Optional	16.4	11	11.0	4.5	0	0	0	0	0
Final Drive									
Shaft and bevel	18.3	28	41.0	84.5	93	94	92	91	89
Chain	1.7	1.5	1.7	4.5	4	4	6	8	11
Shaft and worm	.5	.5	.5	1.5	1	1	1	0	0
Roller	0	0	0	0	1	1	1	1	0
Shaft and spiral—bevel	79.5	70	56.8	9.5	1	....	....	....	....
Type of Axle									
Floating	42.3	43.5	51.8	56.5	65	67	50	0	0
Semi-floating	26	25.5	23.6	23.0	17	26	49	0	0
Three-quarter floating	30.6	29.5	22.8	18.5	14	4	0	0	0
Dead rear axle	1.1	1.5	.6	2.0	3	3	1	0	0
Timing Gear Drive									
Spur gear	2.2	4	8.4	16.1	13	83	....	....	....
Helical or spiral gear	79.0	73	73.0	73.7	77	10	....	....	....
Silent chain	17.6	21	18.1	9.1	10	7	....	....	....
Worm	0	1	.5	1.1	0	0	0	0	0
Spiral bevel	1.2	1	0	0	0	0	0	0	0
Starter Voltage									
Six	89.2	87.5	....	....	....	....	....	....	....
Twelve	9.7	11.5	....	....	....	....	....	....	....
Twenty-four	.5	1	....	....	....	....	....	....	....
Sixty	.6	....	....	....	....	....	....	....	....

Average Car as Real

What the Happy Mean in Specifications Reveals When Taken as Guide

AS a matter of academic interest rather than any great practical value, MOTOR AGE has made a practice each year of calculating from the specifications of all of the cars of the new season the average of each of these specifications which might be said to determine the average American car for that season. The results thus obtained must not be misinterpreted. They are based simply on the number of chassis models produced and have no direct relation to the actual number of cars which are manufactured. Facing this page is reproduced, in its proper proportions, the average car of 1918, as determined by these average specifications, and fitted with a body which, while not showing all of the features of radical newness which characterize the most advanced of the 1918 bodies, is designed to show, in a conservative way, the general trend of body design.

The Cardinal Points

The average American car for 1918, as based on a study of 650 body types carried on 180 chassis models, as offered by 125 car makers, is a car with a six-cylinder, L-head, block-cast engine with a bore of 3 ft. 43 in. and a stroke 4 ft. 94 in. Its wheelbase is 120 ft. 7 in., its tires are 34 by 4, and it sells for $1,822.

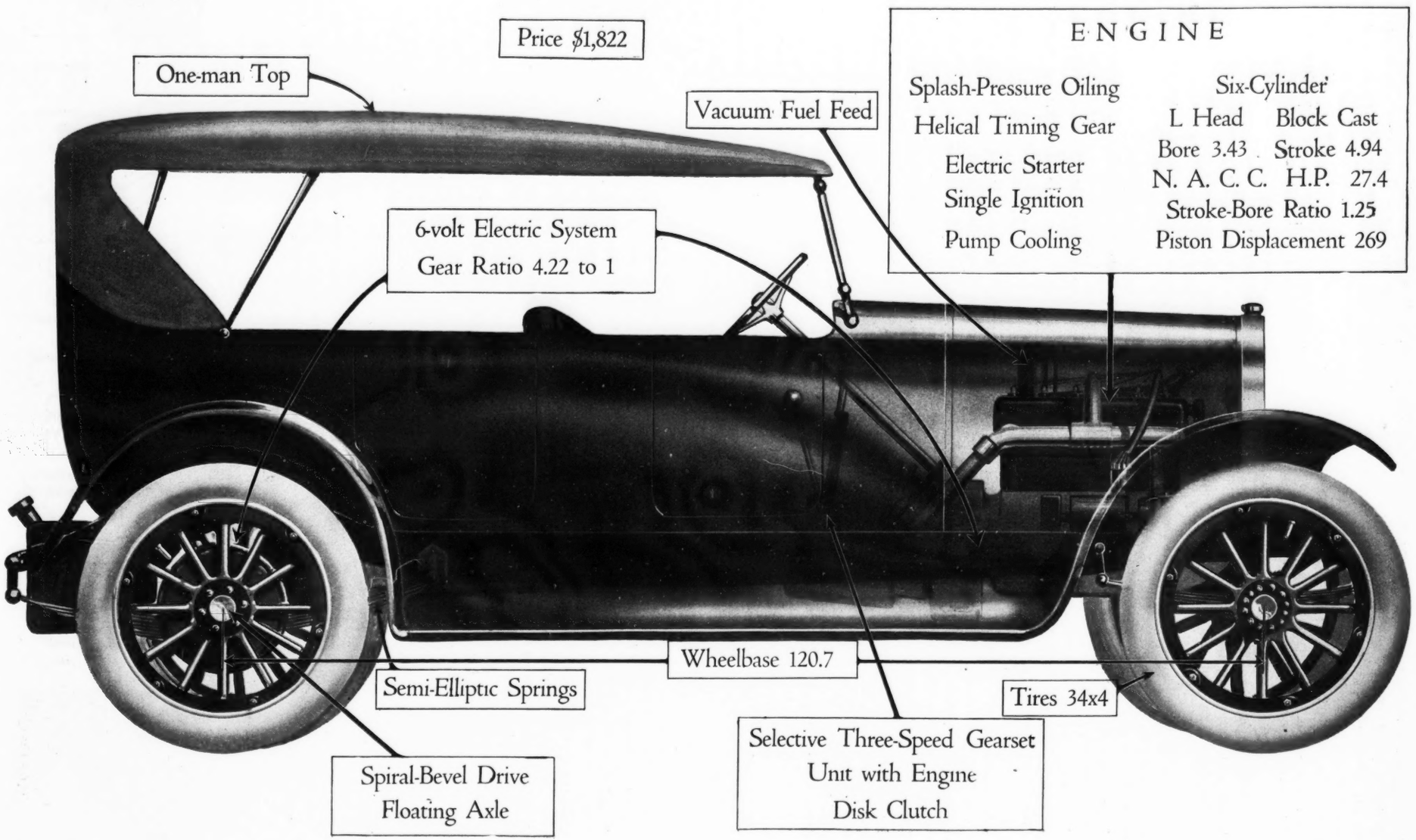
A condensed description of the car, aside from the features mentioned, would point out that this bore and stroke give the engine a piston displacement of 269 in. and its N. A. C. C. horsepower rating would be 27 ft. 4 in., at a piston speed of 1000 ft. per minute. The cylinders are cooled by pump circulation, the engine is lubricated by combination of splash and pressure oiling, and single ignition involving a storage battery and distributor is operated from the electric system.

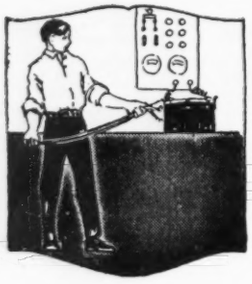
Fuel feed in this average American car for 1918 is taken from a fuel tank at the rear to a vacuum gravity fuel system, and a carburetor attaches almost directly to the cylinder block with an intake manifold which is incorporated within the casting and surrounded by the water of the cooling system.

The clutch is a disk type, in unit with which is a three-speed selective gearset, the drive being through a propeller shaft to a spiral-bevel reduction to the floating axle. The reaction is taken through the semi-elliptic rear springs, through the Hotchkiss principle, and the rear springs are underslung.

The electric system consists of a separate motor and generator operated in conjunction with a 6-volt storage battery through a single-wire system. There are no side lights, the headlight being equipped with double bulbs. The car is a seven-passenger touring car, fitted with a one-man type of top and side curtains which open with the doors. The upholstery, while deep and comfortable, is not of leather, but is of an imitation made from a composition which looks as well and wears almost as long as leather.

Motor Age Presents Herewith the Average Car of 1918





Electrical Equipment of the Motor Car

By David Penn Moreton & Darwin S. Hatch.

Editor's Note—Herewith is presented the seventy-sixth installment of a weekly series of articles begun in MOTOR AGE *issue of June 29, 1916, designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the U. P. C. Book Co., Inc., New York, in a size to fit the pocket conveniently.*

Part LXXVI—Starting, Lighting and Ignition Systems

This section considers the component parts, with their functions, of starting, lighting and ignition systems. Next week the section will be devoted to analyzing starting and lighting troubles by inspecting wiring diagrams

INDIVIDUAL systems of starting, lighting and ignition for motor cars as manufactured by the various companies vary considerably in detail, and the component parts of the same type and make of system are often of different construction when used on cars of different make, but in principle all are alike.

Every standard starting, lighting and ignition system must include the four following important component parts:

1—The generator.
2—The storage battery.
3—The electric motor.
4—A means of producing the spark in the engine cylinders.

The function of these component parts are:

The generator is connected mechanically to the engine and when its armature is made to rotate by the engine, a part of the mechanical energy of the engine, or its ability to do work, is transformed into electrical energy and the electrical energy which is delivered by the generator may be used in charging the storage battery, in lighting the lamps, operating an electric heater, producing the spark in the engine cylinders, etc.

The storage battery serves as a means of storing energy while it is available from the generator and then delivering it at such time as it may be called upon to do so. Thus, while the engine is operating the generator and the generator is capable of delivering electrical energy, this energy may be stored in the battery and then delivered to the starting motor, lights, ignition system, etc., as conditions may demand.

Parts of the System

The electric motor is a device for transforming electrical energy into mechanical energy which may be used in cranking the engine. The electrical energy supplied by the storage battery when it is allowed to discharge through the starting motor circuit thus is utilized in starting the engine.

The ignition device transforms electrical energy, which may be supplied by the storage battery, dry battery or magneto, into heat energy in the spark in the engine cylinders and thus produces the explosion of the gases and causes the engine to operate.

In addition to the four component parts given, various additional parts, such as wires, switches, connectors, ammeters, voltmeters, fuses, circuit-breakers, automatic current and voltage regulators, etc., are necessary for the convenient and safe operation of the four main component parts.

Before taking up the individual systems we will take up an assumed system which is typical of all the common installations on modern cars. In this system, illustrated in Fig. 429, the sidelights are incorporated with the headlights, there being two bulbs in each headlight, one low candlepower and one high candlepower. Lights and horn are connected through a main switch on the cowl.

Some means of connecting and disconnecting the generator and battery is provided in the majority of cases to prevent a discharge of the batteries through the generator when the voltage of the generator is lower than the voltage of the battery. This device is called a cut-out and it has been omitted from the diagram for the sake of clearness.

The generator in this case is connected mechanically to the engine shaft by a silent chain, and the circuit through which the generator sends the charging current for the storage battery may be traced as follows: Starting with the ground connection G, you follow along the wire 1, through the generator along wire 2, through the ammeter, along wire 6 to junction point 7, then along wire 8 to the battery, through the battery and along wire 9 to the frame of the car, which is the same as the ground connection G1, from which you started, since all indicated ground connections are in reality connections to the frame, and in such cases the electrical circuit is completed through the chassis.

It sometimes is difficult to determine from a wiring diagram or from the wires themselves on a car just which of two or more wires at a junction are taking the current. This always can be ascertained by remembering that current will flow only where there is a complete circuit, for instance, in the circuit just mentioned all the switches are open, except the connection between the generator and battery, and that therefore is the only complete circuit. Consequently when we come to the junction of the two wires at the ammeter we know that no current is going up on wire 4 to terminal 26 on the cowl switch because this switch is open, and the horn button and the cowl light switch 33, is open so that there is no connection to any circuits out of the switch. Likewise when we come to junction point 7 we know that all the current must pass down through wire 8, and none through wire 12, because the starting switch is open.

The ignition in this case is provided by a high-tension magneto driven from the engine shaft by gears. The ignition circuit is not shown in detail but it is controlled by the ignition switch shown in the upper right-hand corner.

The motor circuit may be traced in a similar manner by starting with the ground connection G2. You follow along the wire 10, through the motor along the wire 11 to the starting switch, through the starting switch, when it is closed, along the wire 12 to the junction point 7, along the wire 8, through the battery, along the wire 9 to the frame of the car, which is the same as the ground connection G2, from which you started. The motor

switch in this case is operated by pressing on a pedal, which also causes a pinion P on the motor shaft connection to engage with a gear on the flywheel and thus establish a mechanical connection between the motor and the engine shaft. This mechanical connection between the engine and the motor is maintained and the electrical circuit through the motor and battery remains closed as long as the pedal is pressed down.

The electrical circuit for the low candlepower headlights, when they are operating off the storage batteries, may be traced as follows: Starting with the frame of the car or grounded terminal of the battery you pass along wire 9, through the battery and along wire 8 to junction point 7, then along wire 6 through the ammeter along wire 4 to terminal 26 of the cowl switch, then from terminal 14, when the switch is closed, along wire 15 through fuse 16, along wire 17 to the junction point 18, where the circuit divides, part of the current passing through bulb L to ground G3 and part through bulb L2 to ground G4. The ground connections, G3 and G4 are the same as the point from which you started. The circuit for the high-candlepower headlight is the same as that for low-candlepower lights up to terminal 26, then with switch thrown to terminal 23 you pass along wire 22, through 21, along wire 20 to junction point 19, where circuit divides, part of current going through bulb L3 to ground G5 and part through L4 to ground G6. It will be observed that this last circuit was traced through the battery in the opposite direction to that of the generator and motor circuits, but the results are just the same except in one case you will follow along the circuit in the direction of the current and in the other case in the opposite direction. In each case you must return to the point from which you started.

The circuit for the cowl light is the same as the headlights up to switch terminal 26, then along wire 24 through the cowl light switch 33 and bulb along wire 25 to the ground connection G7. The circuit for the horn is the same as that for the headlights up to terminal 26 on the cowl switch, then along wire 27 through fuse 28, along wire 29 and through the horn along wire 30 through the horn button when it is closed to the ground connection G8.

The circuit for the tail light may be traced as follows: From the frame of the car along wire 9 through the battery along wire 8 to the junction point 7 along wire 6 through the ammeter along wire 4 to terminal 26 to terminal 13 when switch is closed through wire 3 through the fuse 31 along wire 32 through the tail light and to the ground connection G9.

Assuming the generator is not charging the battery and that all lights are turned on and the horn button is closed, determine the current in the different wires. Wires 9, 8 and 6 will be carrying the total current supplied by the battery. The current in wire 12 will be zero, since the motor switch is open, so that the current through the ammeter is that taken by the large and small headlights, horn, tail light and cowl light. Wires 4, 3 and 32 carry the current for the tail light. Wire 4 carries the current taken by the horn, headlights, taillight and cowl light. Wires 27, 29 and 30 carry the current taken by the horn. Wires 15 and 17 carry the current taken by the low-candlepower headlights. Wires 20 and 22 carry the current taken by the high-candlepower headlights. If the motor switch is closed, the current in wires 8 and 9 will be equal to the current supplied by the battery, and wires 10, 11 and 12 will carry the motor current.

Assuming the motor circuit open and all the other circuits closed and the generator delivering current, if the current delivered by the generator is just equal to the current taken by the horn, tail light, cowl light and headlights, there will be no current in the ammeter. If the current delivered by the generator exceeds in value the current taken by the horn, tail, cowl and headlights, the current in the ammeter will be toward junction point 7, and the ammeter will show charge. Should the value of the generator current exceed that of the combined currents taken by the horn, tail light, cowl light and headlights, a charging current will be sent along wires 6, 8 and 9. When all the lamps and horn are disconnected, all current supplied by the generator passes through the battery. If the terminal voltage of the generator is lower than the terminal voltage of the battery, then the battery will supply current to all the lamps and horn and in addition send a current through the generator, unless the connection between the generator and battery is broken by some form of cut-out, and the generator will tend to operate as a motor. When the battery is supplying current through the lights or horn the ammeter will show discharge.

The reader must bear in mind always that every electrical circuit is just like a circle. It has neither beginning nor end. It is absolutely imperative that you be able to trace the various electrical circuits on the motor car to clearly understand their operation and know how to test and locate readily the various causes of trouble which are likely to arise. Always bear in mind that electricity is not used up and just as much returns to the generator or battery as leaves it. It is the energy, or ability to do work, possessed by the electricity when it leaves the generator or battery when the battery is discharging which is used in the electrical circuit.

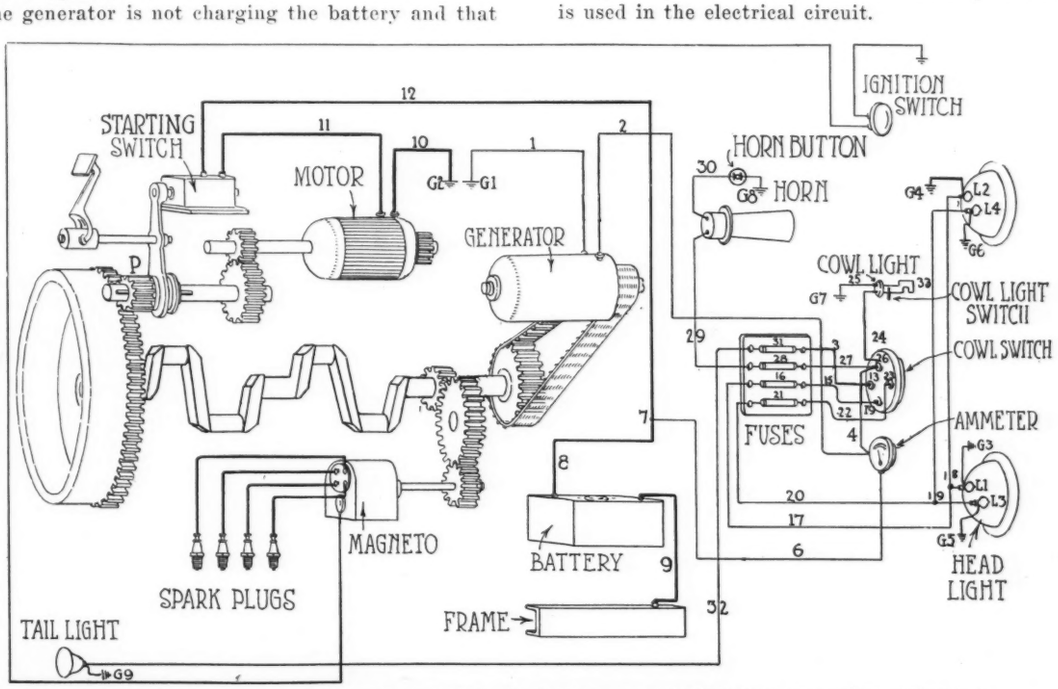


Fig. 429—Wiring diagram assumed as typical of all the common installations on modern motor cars. Reference is made to the figures in tracing electrical circuits

Contents of "Made in America Cars" and Buyer's Guide

BODY STYLE	ILLUS. PAGE	GUIDE PAGE
Five-passenger touring	34	68
Two-passenger roadsters	38	69
Odd-capacity roadsters	40	70
Four-passenger roadsters	41	69
Four-passenger touring	42	69
Seven-passenger touring	44	68
Sedans	48	71
Open Sedans	50	70
Convertible Sedans and Coupes	52	70
Coupes	53	71
Landaulets	55	70
Limousines	56	71
Broughams and Town Cars	58	71
Berlines	59	70
Unclassified Closed Cars	60	..
Unclassified Open Cars	61	..

WAR'S EFFECT ON DEALERS

(*Concluded from page* 17)

every chance to make a dollar—which they should have done long ago.

Garages and repairshops should be busy. With the old cars being run another year the four and one-half million cars must have repairs. Repairing is one line that seems to be in excellent condition at this very moment. The sale of accessories of the right sort should hold up. The truck field should be prosperous. The accessory jobber looks like a winner unless something we cannot now foresee happens.

And then—after the war: The people who would have bought cars but didn't because of the war are going to buy. They are going to spend money in the spirit of a boy let out of school. The lid will be off. Industry should spin. Of course, there will be after-war readjustment problems, but there should be a demand for all kinds of goods and no good American could sit easy and see a perfectly good demand for anything go to waste. It is not the custom of the country.

Probably after the war a lot of less efficient dealers and garagemen will spring up. That always happens in any trade that is prosperous. And then we shall have many of our old troubles all over again.

But it does seem as though some of our problems of service and wild American waste should have been blotted out forever.

KISSEL RELEASED FROM CONTRACT

Washington, Dec. 29—The Kissel company has been released from its contract for 500 Class B heavy duty War Trucks because of its need for all facilities to handle contracts for four-wheel-drive trucks recently received. The contract for the 500 B trucks was transferred to the Garford Motor Truck Co., making the Garford contract for B trucks total 1000. It is rumored that two or three other concerns will be released from their contracts also.

Word has come that the first of the B trucks will be ready probably about the 10th of January and will then start the first of the drive-aways of Uncle Sam's own trucks. A repair plant has already been started at Baltimore to be completed by March 1 which will care for necessary repairs of the trucks, and will also house the general equipments needed by the trucks abroad.

MOLINE BUILDER CHANGES NAME

Moline, Ill., Dec. 31—The name of the Moline Automobile Co., maker of Moline-Knights, has been changed to Root & Vandervoort Co.

ANOTHER ARMY TRAIN

Washington, Dec. 29—Thirty army 1½-ton trucks passed through here last night, carrying thirty men to the truck, enroute to Belvoir, Va., from Camp Meade, a distance of 110 miles. The journey was completed in 20 hr. actual driving.

More Truck Contracts

WASHINGTON, Dec. 29—Contracts for 4100 war trucks for service in the aviation section of the Signal Corps have been awarded as follows:

2200 1½-Ton Trucks

Signal Motor Truck Co.	500
Republic Motor Truck Co.	500
Denby Motor Truck Co.	500
General Motors Truck Co.	700

1900 3½-Ton Trucks

Standard Motor Truck Co.	250
United Motor Truck Co.	250
Federal Motor Truck Co.	500
Kelly-Springfield Truck Co.	500
Velie Motor Co.	400

PRICES AND MATERIALS

(*Concluded from page* 19)

increased from 20 to 40 per cent, depending on the nature of contracts between manufacturer of tires and the car maker.

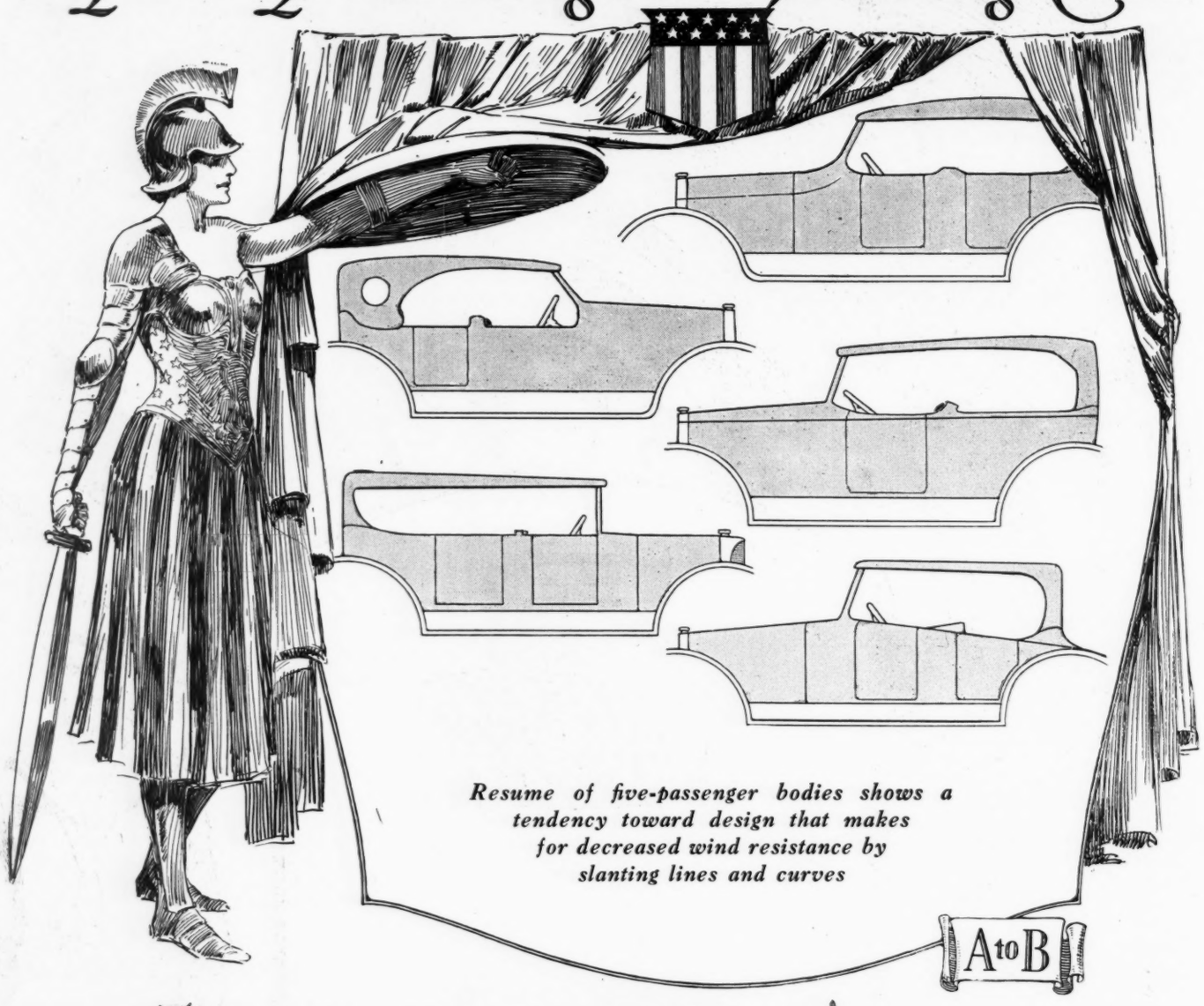
With all these increases in materials, it readily is appreciated why a car which a few months ago sold for $800 now is selling at from $1,000 to $1,050 or $1,100. To the price of materials must be added the greatly increased cost of labor. In some cases labor has increased 40 per cent.

There is another factor which must be considered in the present increase in prices, and which the consumer should not object to, and that is the increased cost due to decreased production. During the last six months the production of motor cars has dropped off, and while some of our factories are producing 100 per cent capacity, others are at 33 per cent, others at 50 per cent and some at 75. You cannot cut production in half without greatly increasing the cost of manufacture, and so some of the advertisements during the last few months, which have attributed the increase in price to higher materials and higher labor, have not told the complete truth, but should have added the increased price due to cutting down of production.

As stated, the ultimate consumer should not complain about paying for increased cost of production, because in 1915 and 1916 the maker was very free to reduce prices when he was increasing production. In those years the buyer quickly was given the advantage of reduced cost due to increased production, and in this year the manufacturer should play as open with the public by advertising that its increased cost is due not only to the higher cost of the materials, the cost of labor and the higher cost of transportation on materials and parts, but also the higher cost due to a decrease in production.

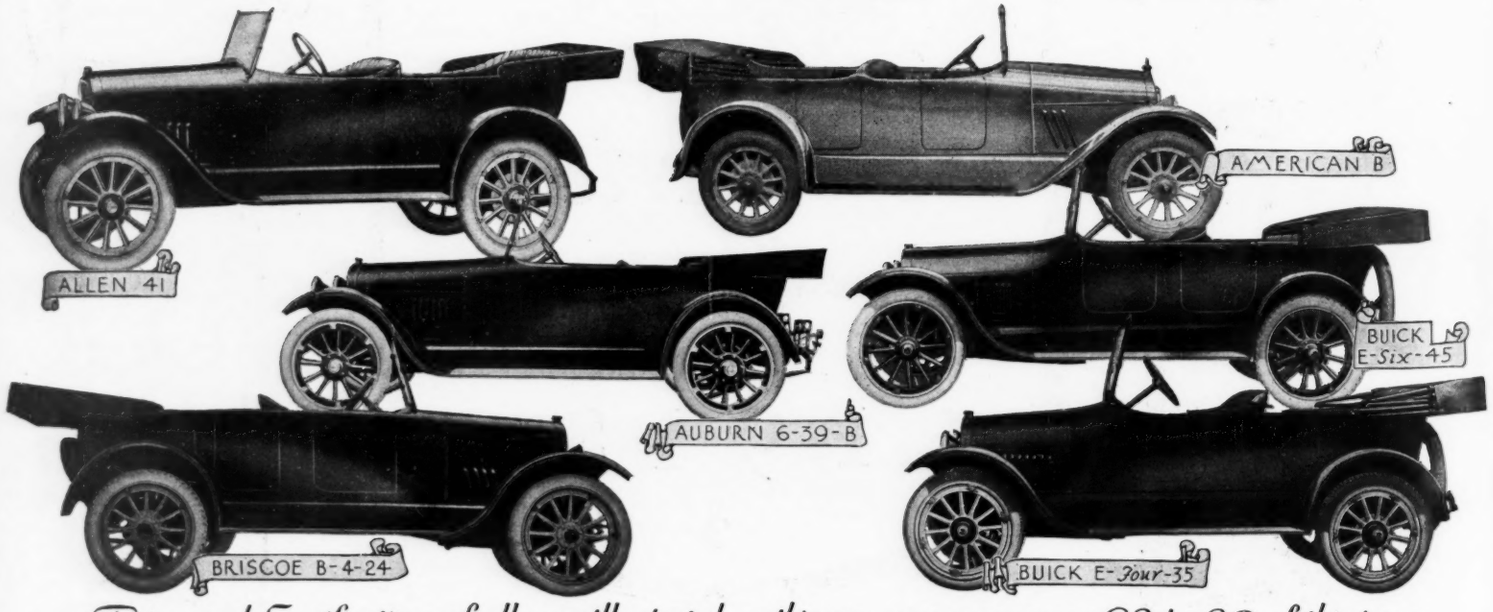
Made in America Cars
1918

Five-Passenger Touring Cars

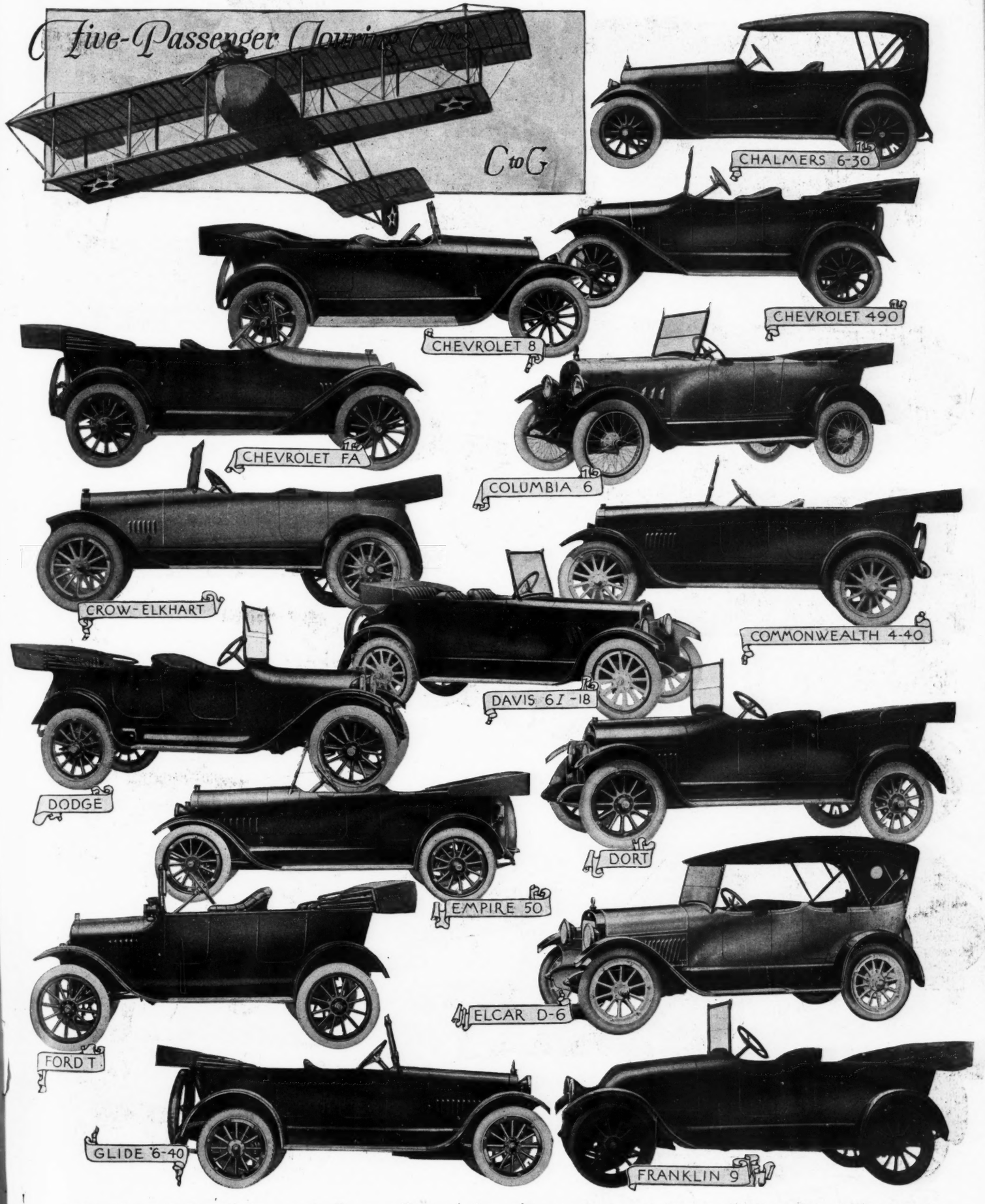


Resume of five-passenger bodies shows a tendency toward design that makes for decreased wind resistance by slanting lines and curves

A to B



Prices and Specifications of all cars illustrated on this page appear on pages 68 to 80 of this issue.

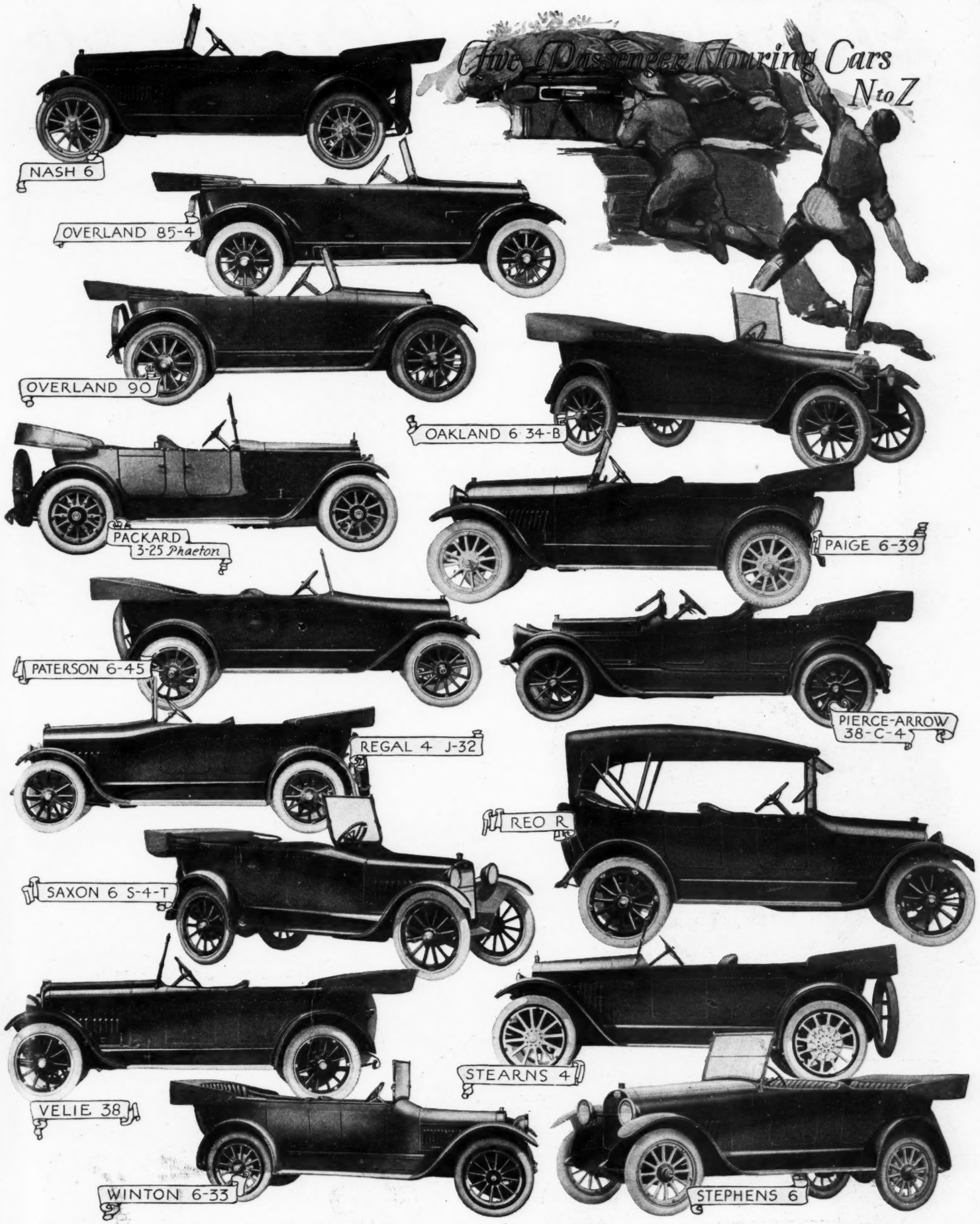


Prices and Specifications of all cars illustrated on this page appear on pages 68 to 80 of this issue.

Five-Passenger Touring Cars G to M

Prices and Specifications of all cars illustrated on this page appear on pages 68 to 80 of this issue.

Five-Passenger Touring Cars N to Z

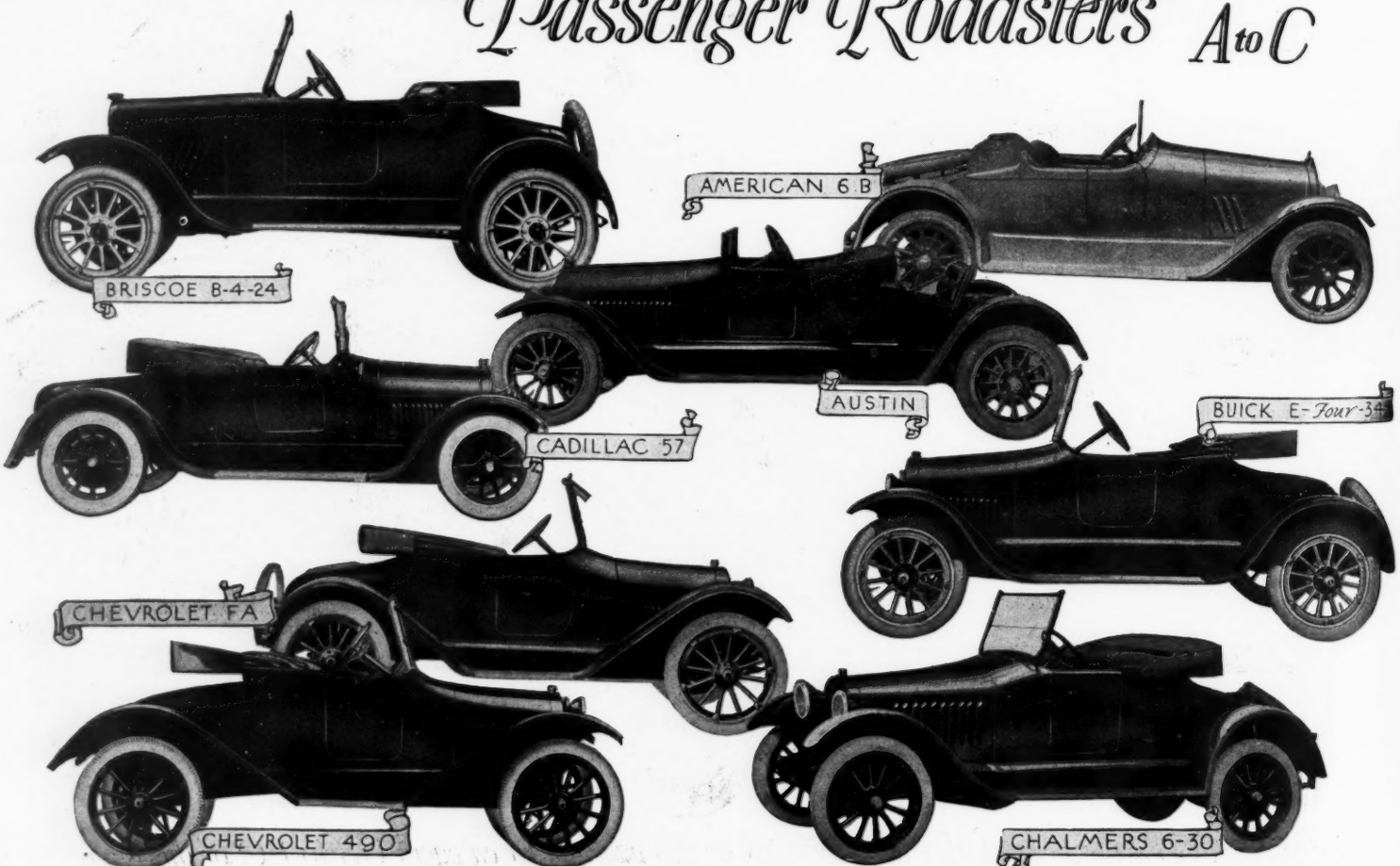


Prices and Specifications of all cars illustrated on this page appear on pages 68 to 80 of this issue.

Roadsters and Runabouts

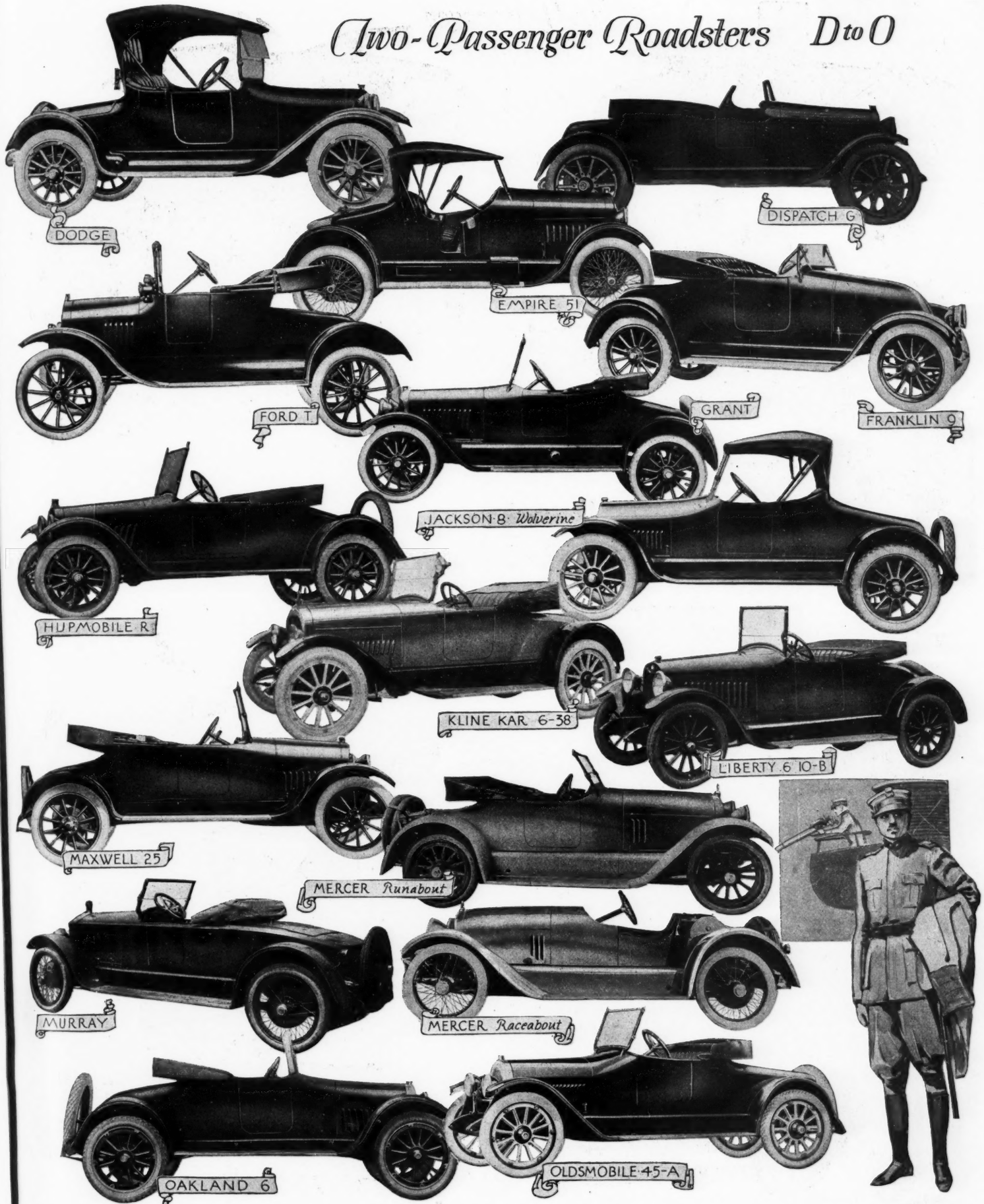
Modern ingenuity has devised various seating arrangements for roadster and runabout. Among them is the four-passenger, the three-passenger and the one-seat car

Two-Passenger Roadsters A to C



Prices and Specifications of all cars illustrated on this page appear on pages 68 to 80 of this issue.

Two-Passenger Roadsters D to O

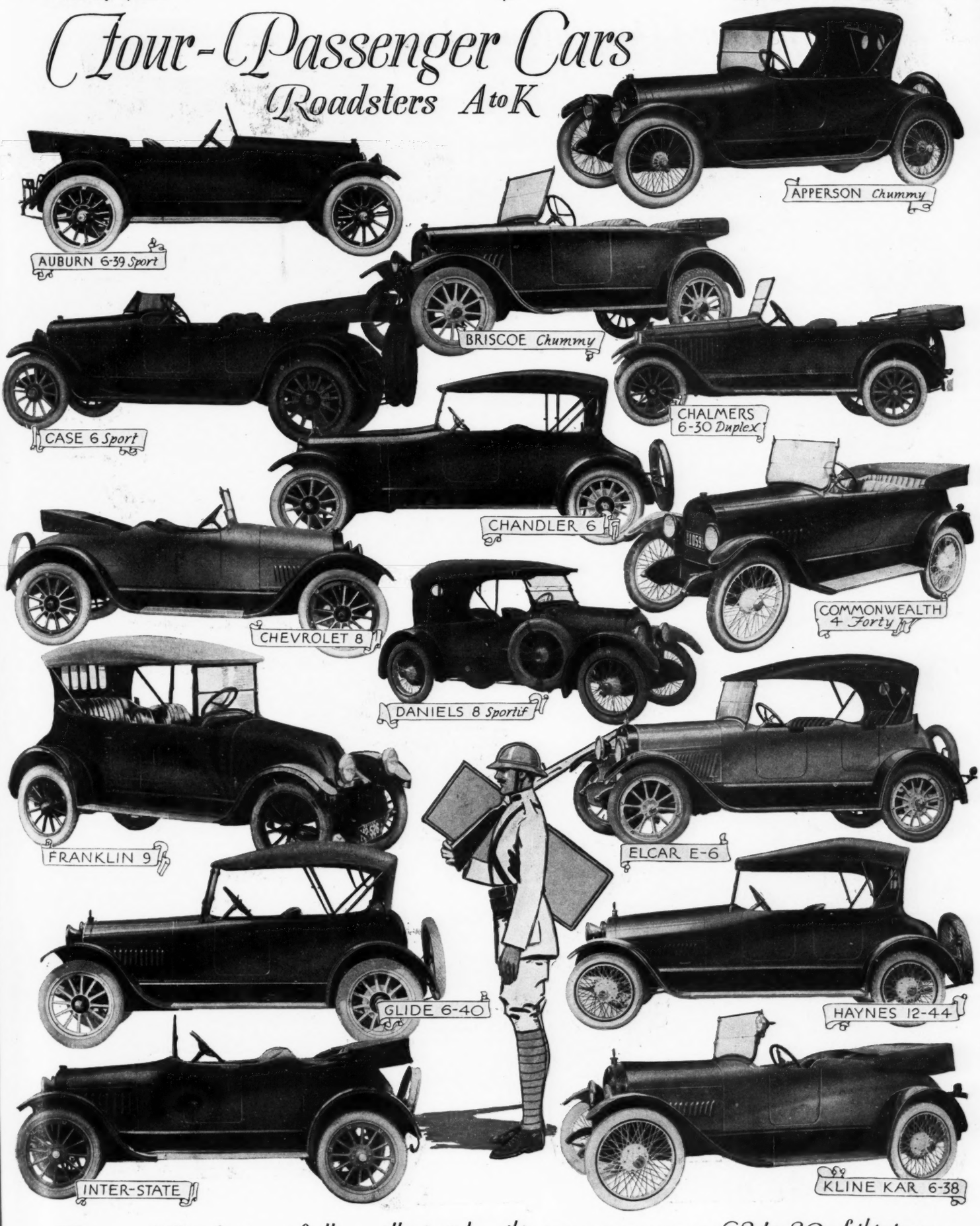


Prices and Specifications of all cars illustrated on this page appear on pages 68 to 80 of this issue.

Prices and Specifications of all cars illustrated on this page appear on pages 68 to 80 of this issue.

Four-Passenger Cars

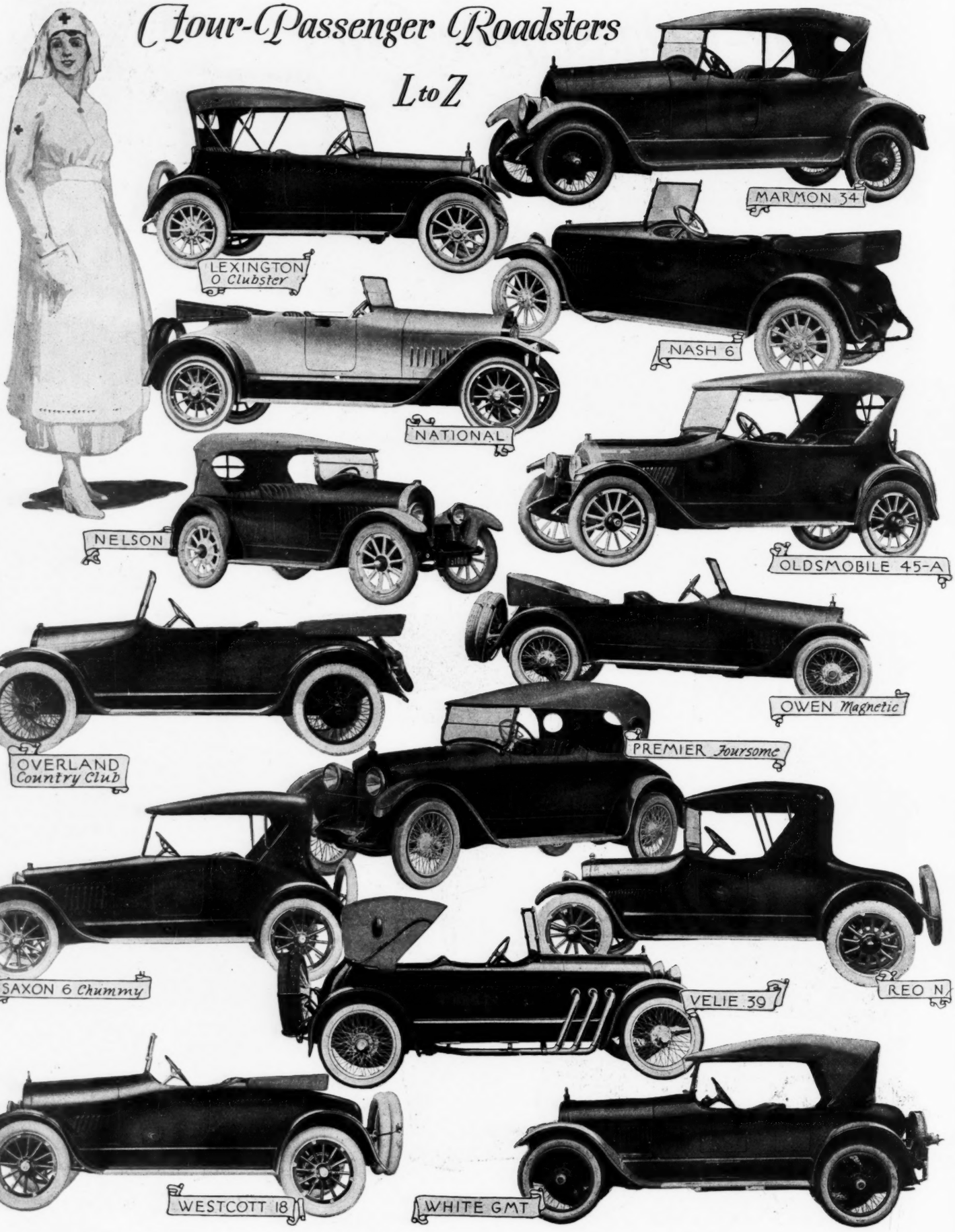
Roadsters A to K



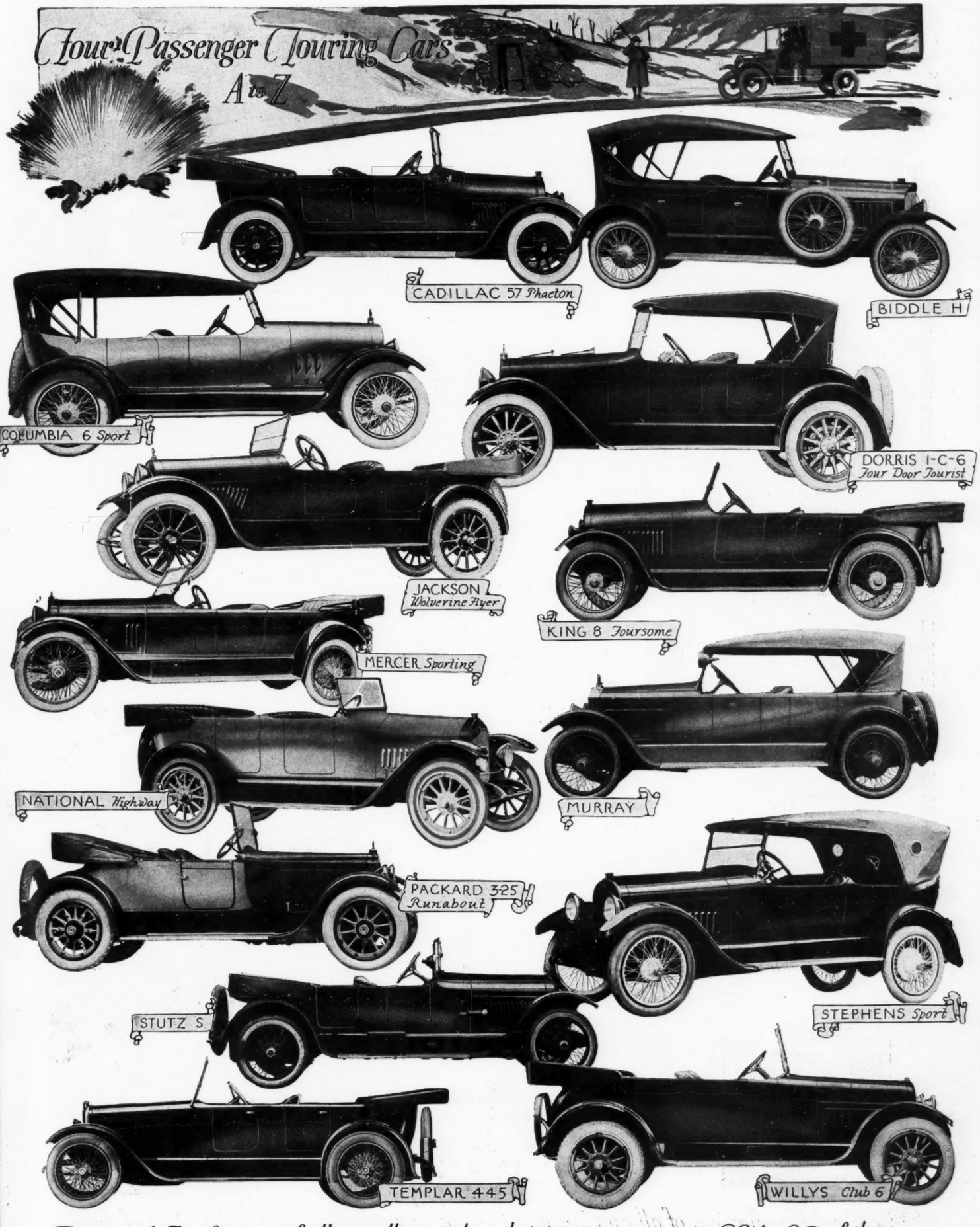
Prices and Specifications of all cars illustrated on this page appear on pages 68 to 80 of this issue.

Four-Passenger Roadsters

L to Z



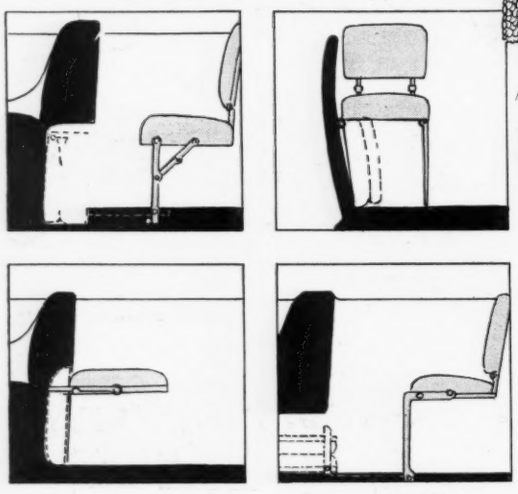
Prices and Specifications of all cars illustrated on this page appear on pages 68 to 80 of this issue.



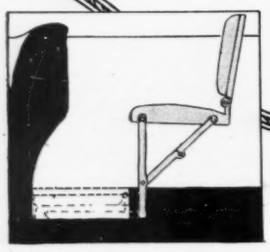
Prices and Specifications of all cars illustrated on this page appear on pages 68 to 80 of this issue.

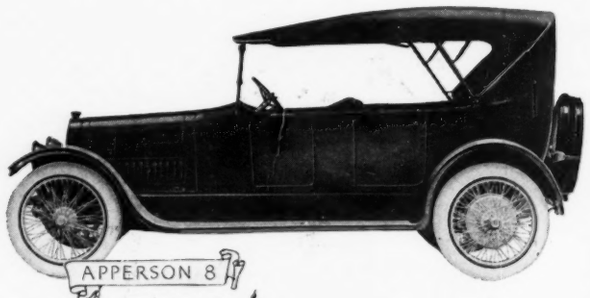
Seven-Passenger Touring Cars

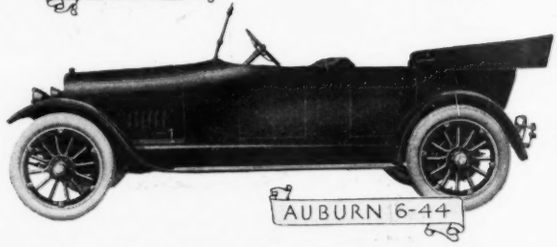
A to B

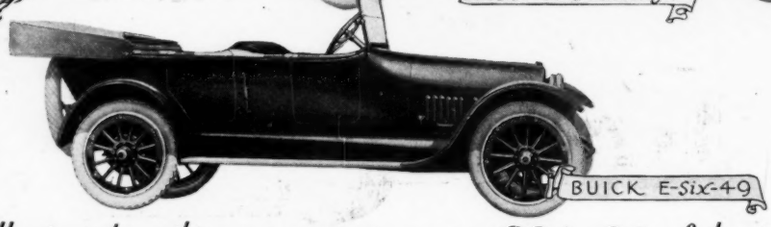


Seven-passenger touring cars call for fine treatment of the auxiliary seats which give the extra carrying capacity. In these drawings are exhibited various ways and means of working in the extra seat in motor cars









Prices and Specifications of all cars illustrated on this page appear on pages 68 to 80 of this issue

Seven-Passenger Touring Cars

C to H

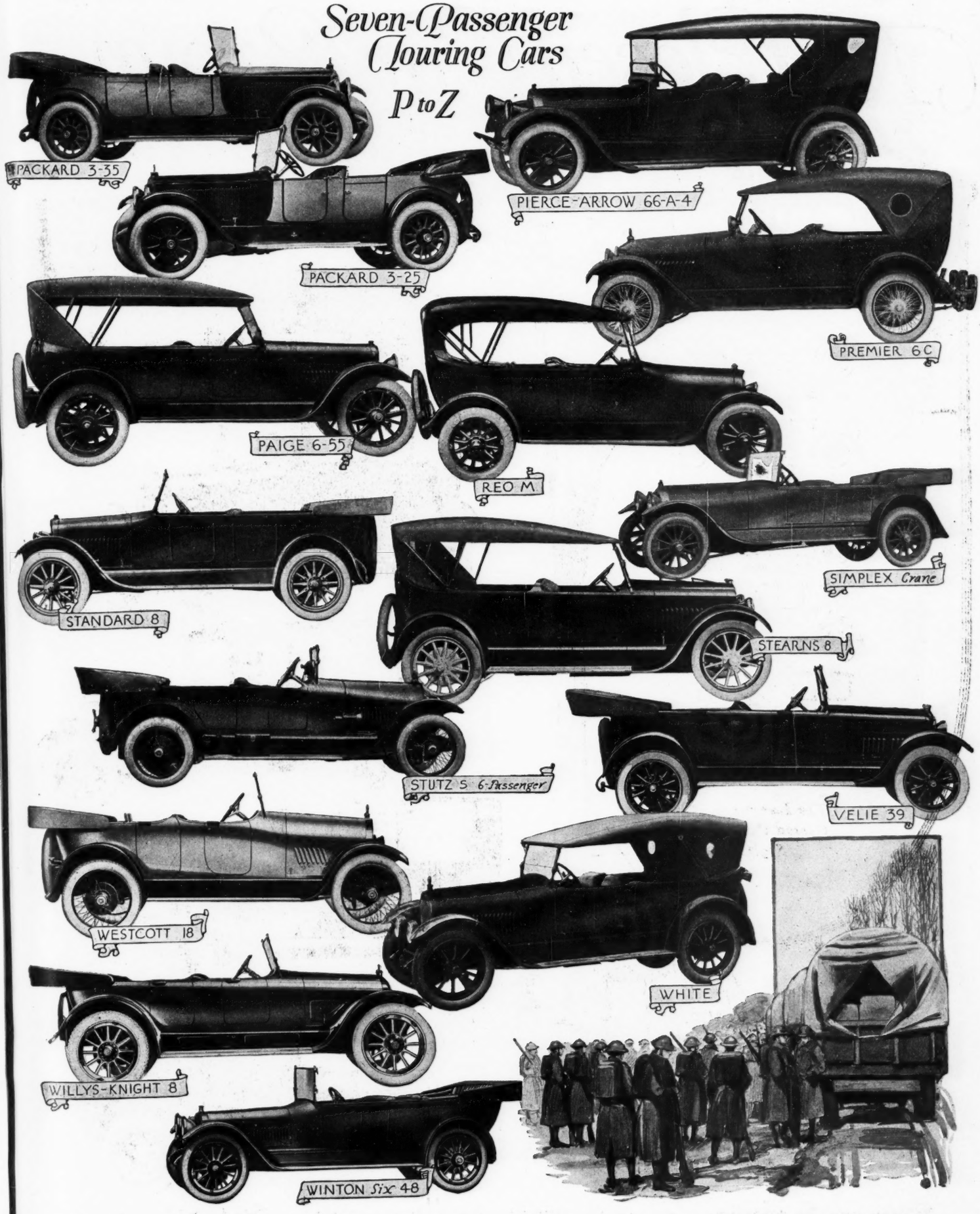
Prices and Specifications of all cars illustrated on this page appear on pages 68 to 80 of this issue.

Seven-Passenger Touring Cars J to O

Prices and Specifications of all cars illustrated on this page appear on pages 68 to 80 of this issue.

Seven-Passenger Touring Cars

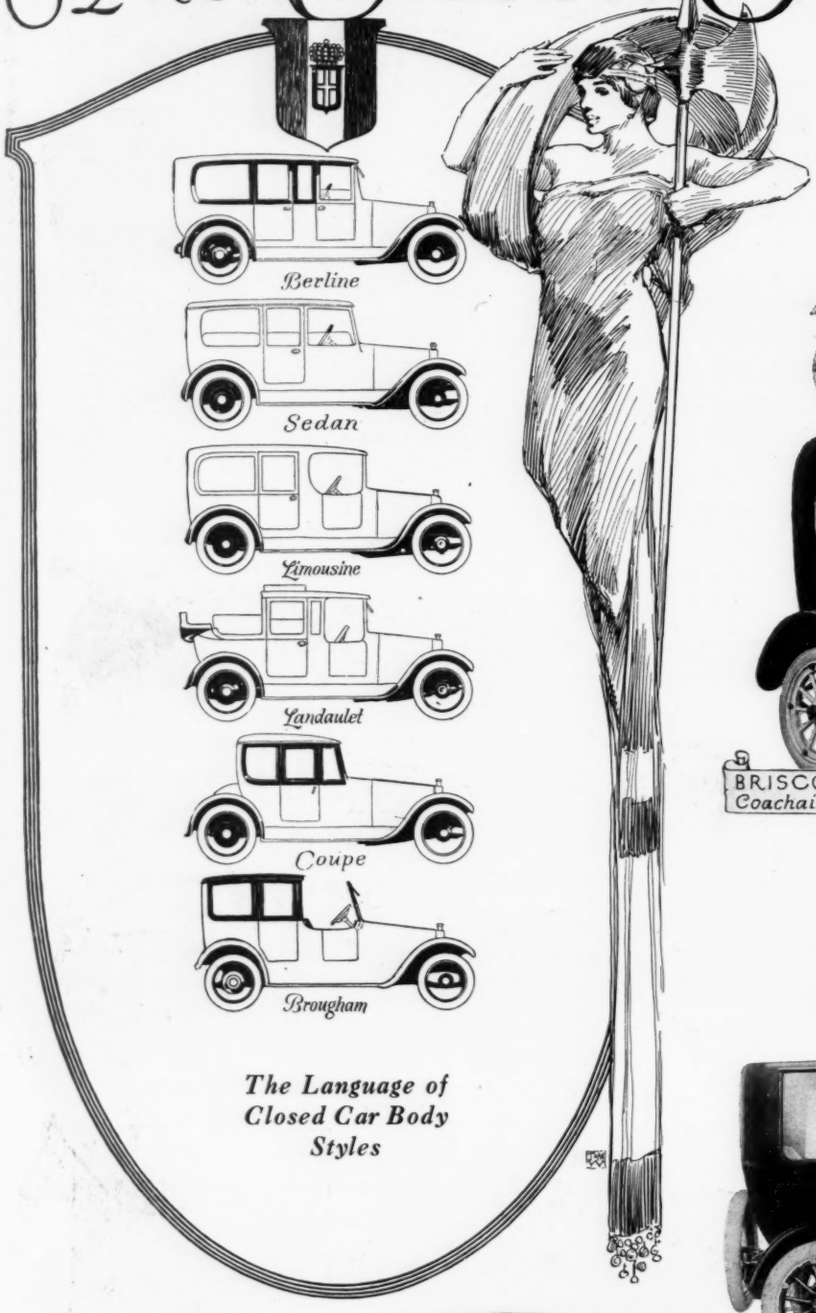
P to Z

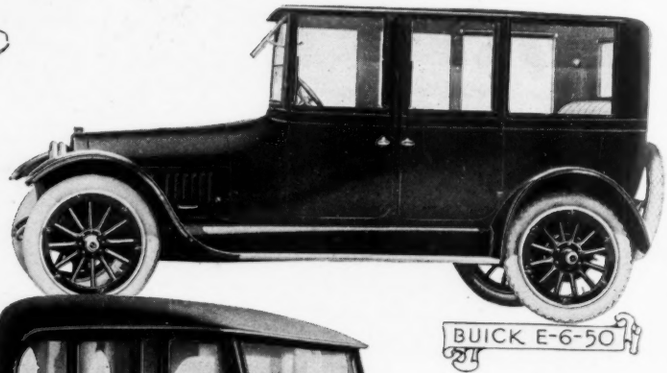


Prices and Specifications of all cars illustrated on this page appear on pages 68 to 80 of this issue.

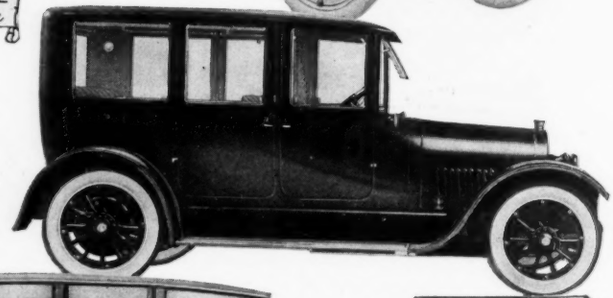
The Closed Car Group

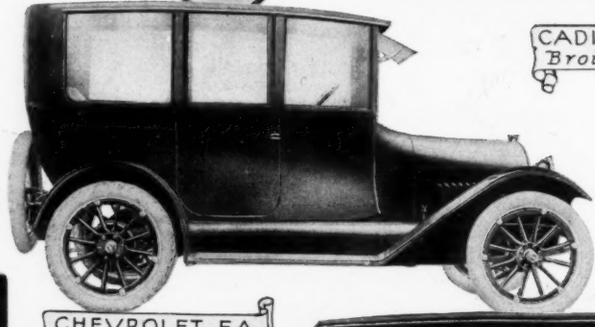
Sedans A to E

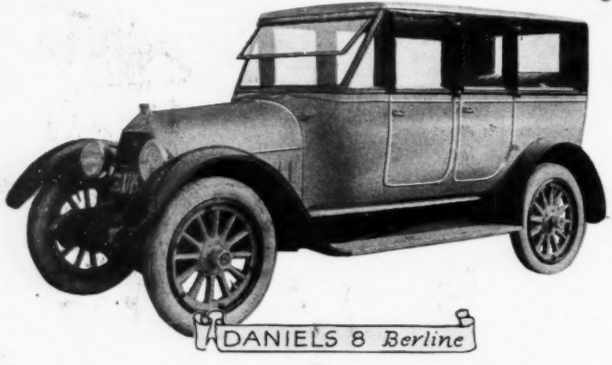


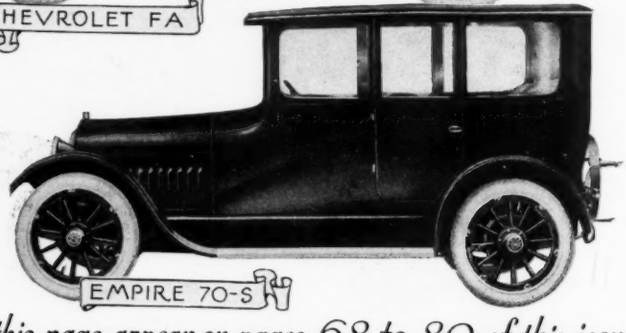

BUICK E-6-50

BRISCOE Coachaire


CADILLAC 57 Brougham

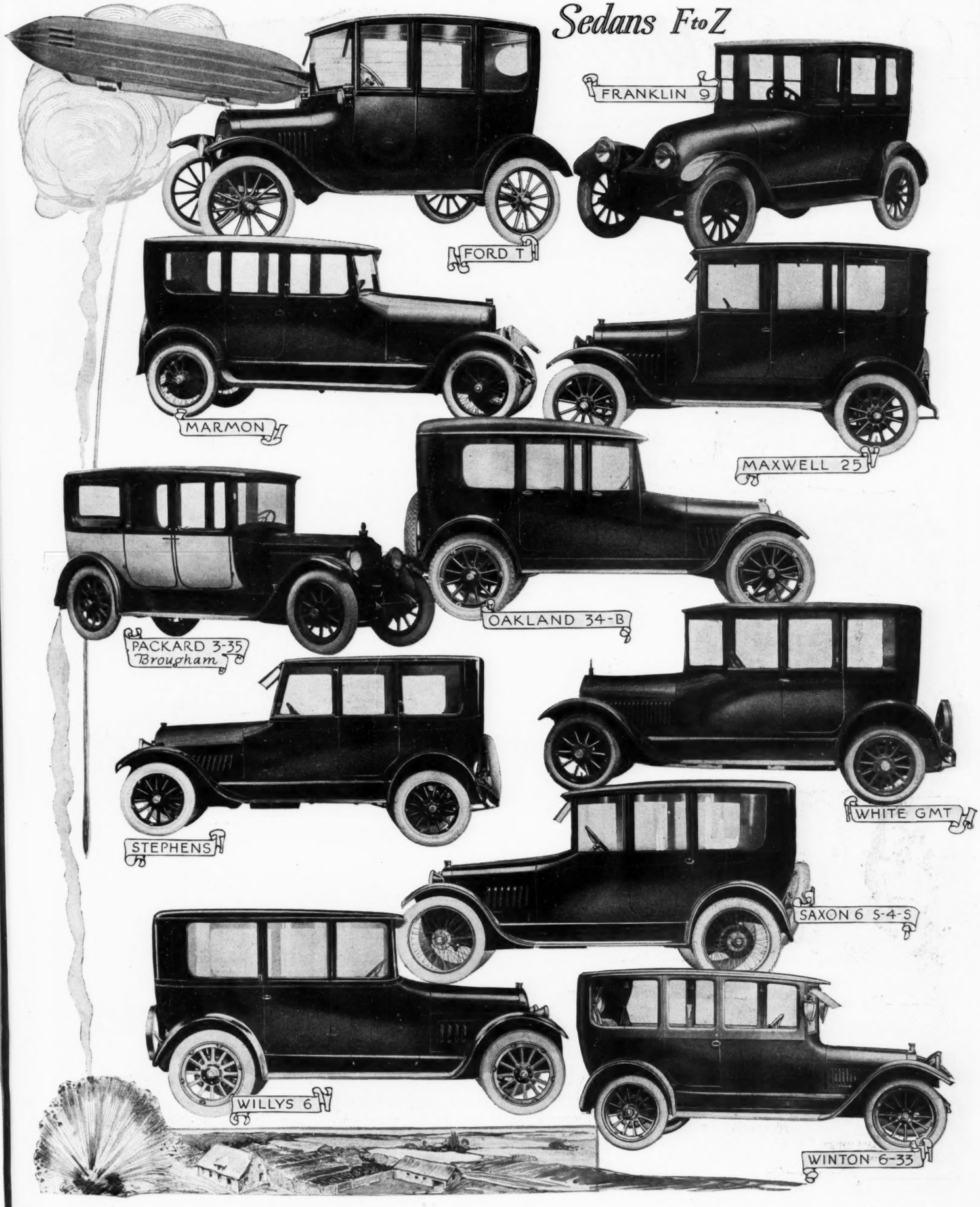

CHEVROLET FA


DANIELS 8 Berline


EMPIRE 70-S

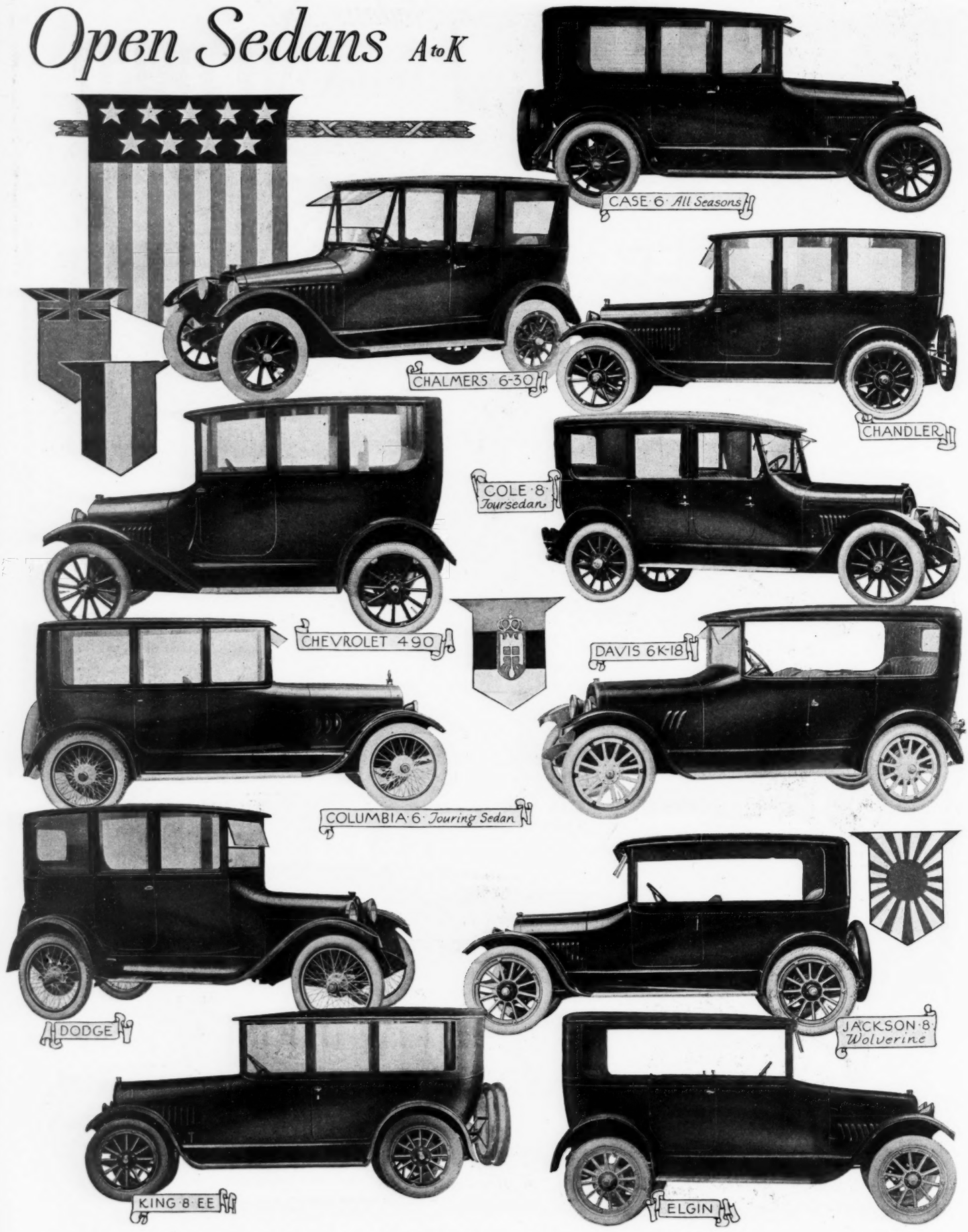
Prices and Specifications of all cars illustrated on this page appear on pages 68 to 80 of this issue.

Sedans F to Z



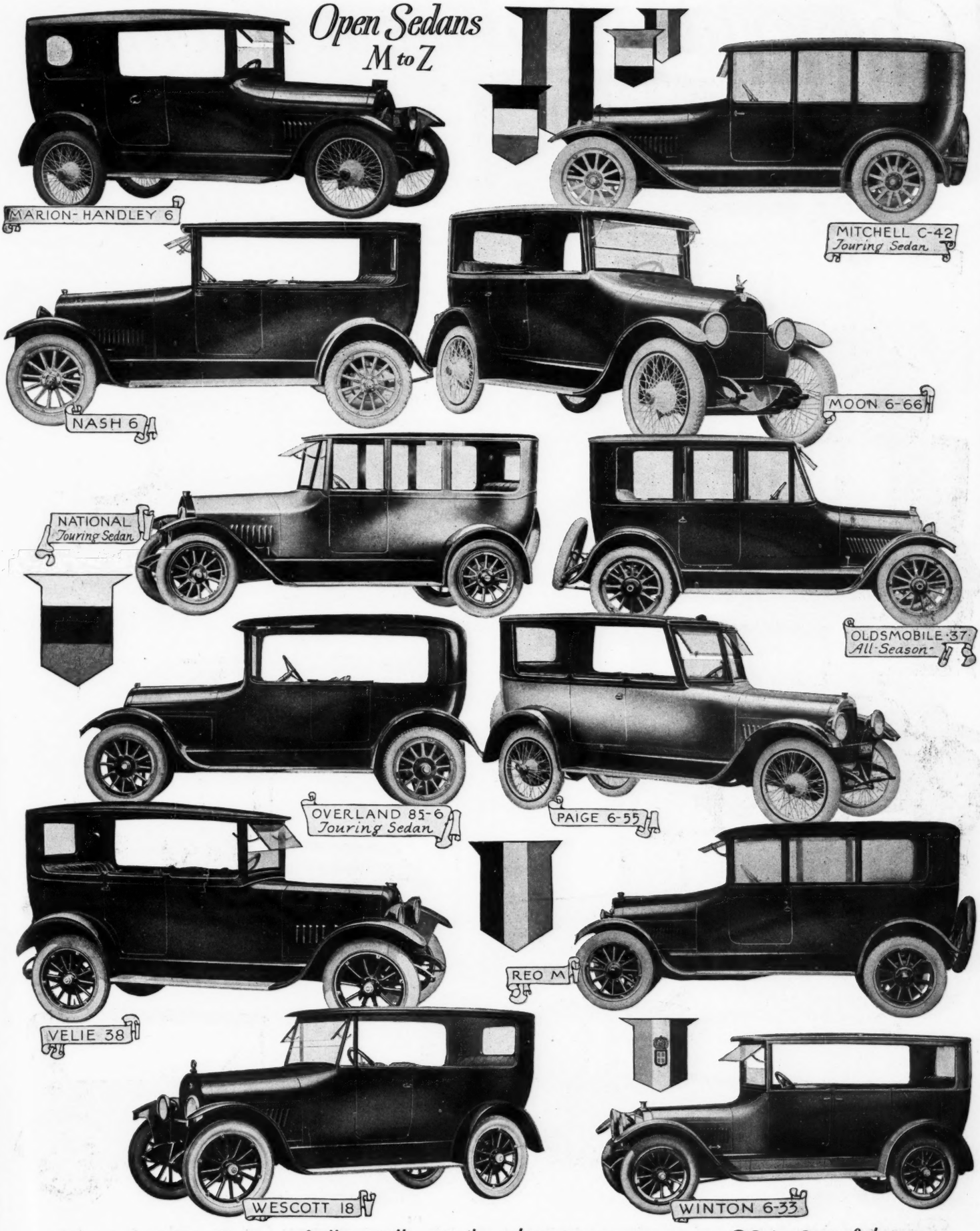
Prices and Specifications of all cars illustrated on this page appear on pages 68 to 80 of this issue.

Open Sedans A to K



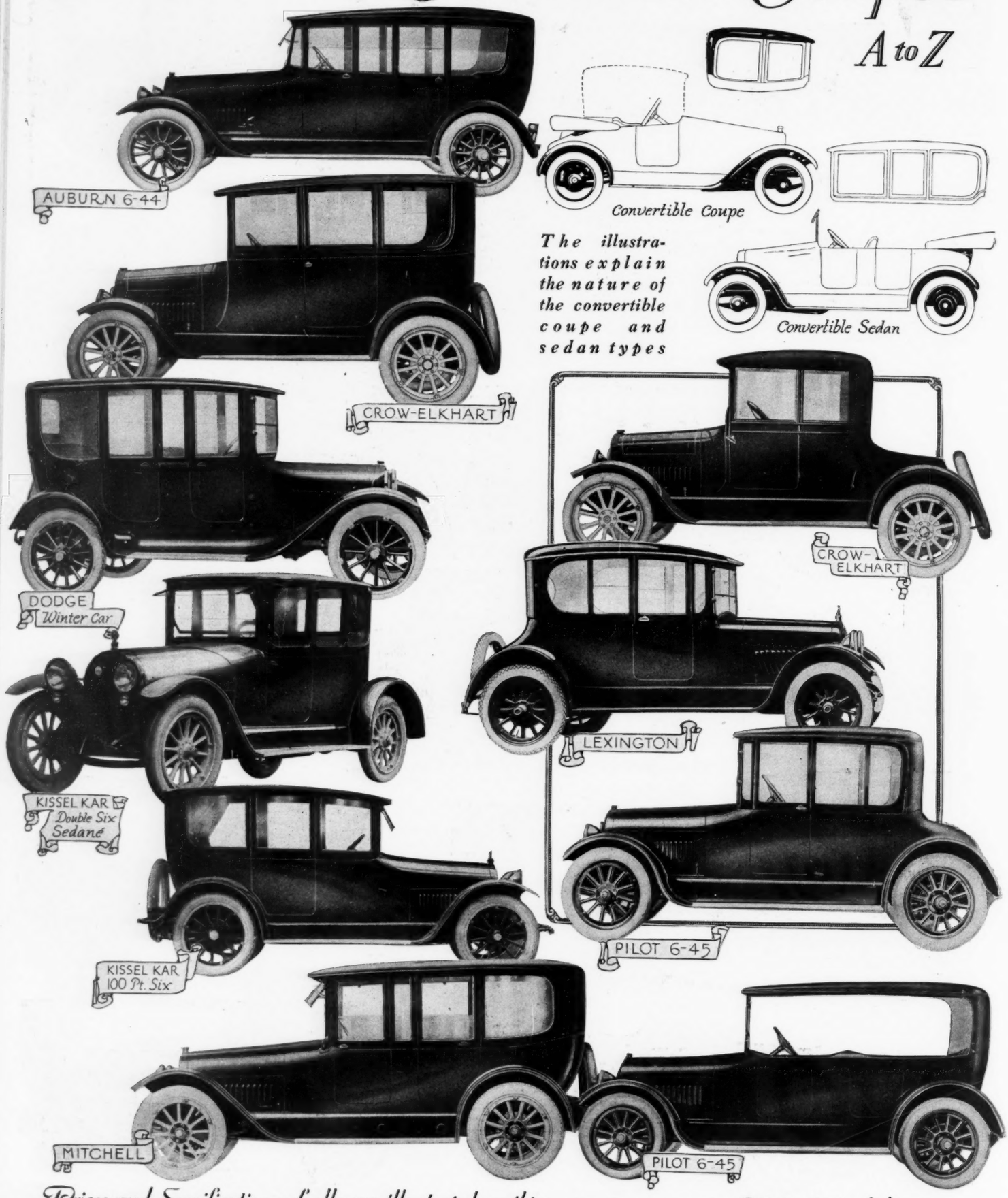
Prices and Specifications of all cars illustrated on this page appear on pages 68 to 80 of this issue.

Open Sedans M to Z



Prices and Specifications of all cars illustrated on this page appear on pages 68 to 80 of this issue.

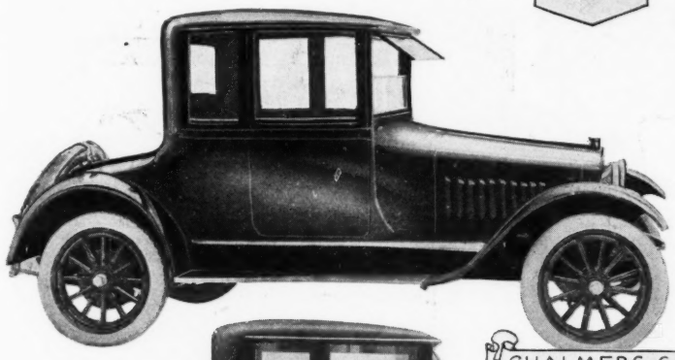
Convertible Sedans and Coupes A to Z



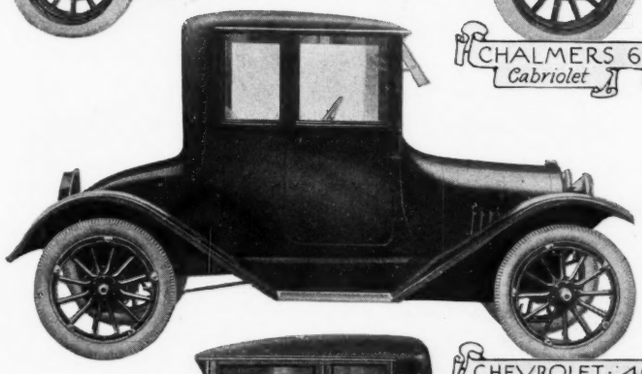
Prices and Specifications of all cars illustrated on this page appear on pages 68 to 80 of this issue.

Coupes

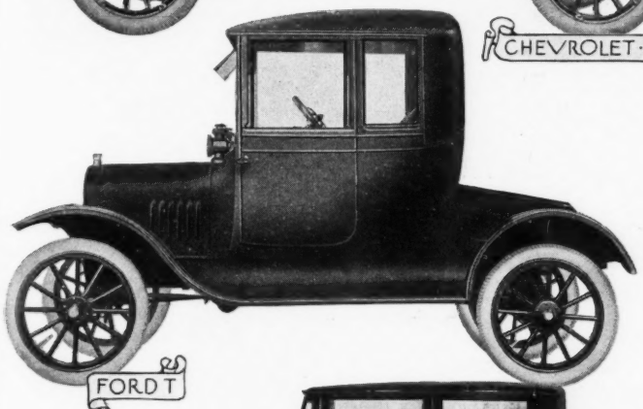
A to M



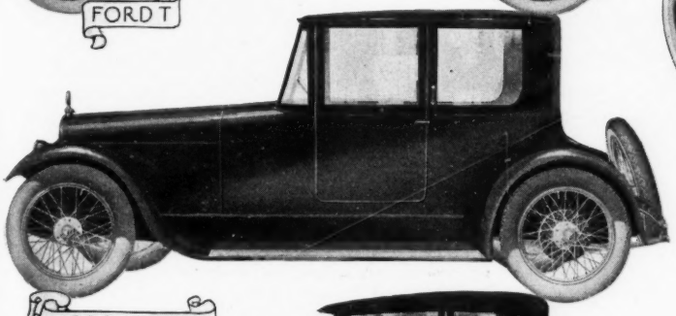
CHALMERS 6-30
Cabriolet



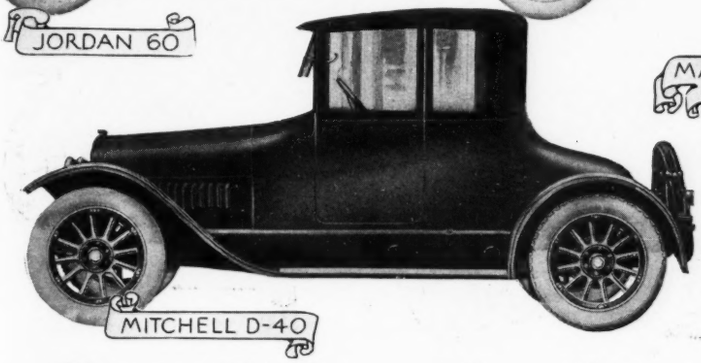
CHEVROLET · 490



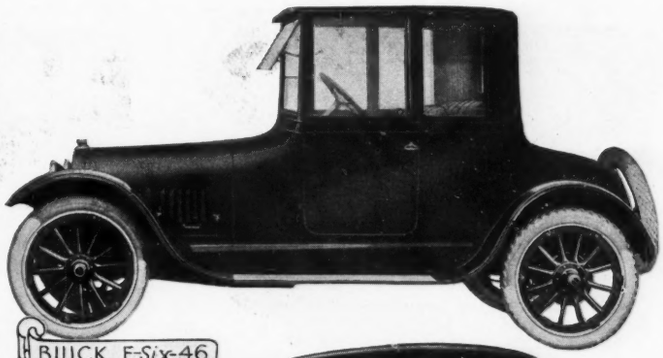
FORD T



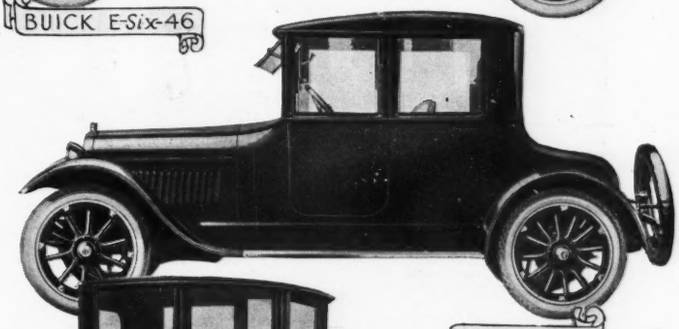
JORDAN 60



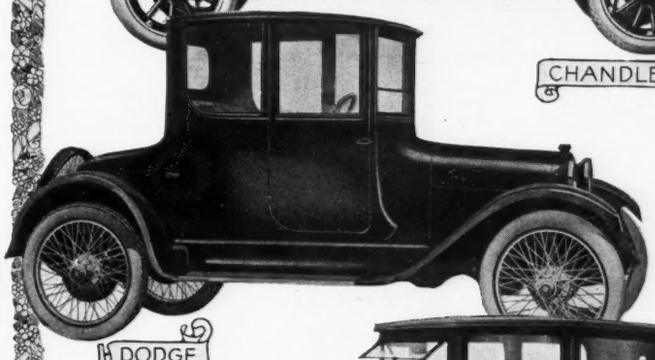
MITCHELL D-40



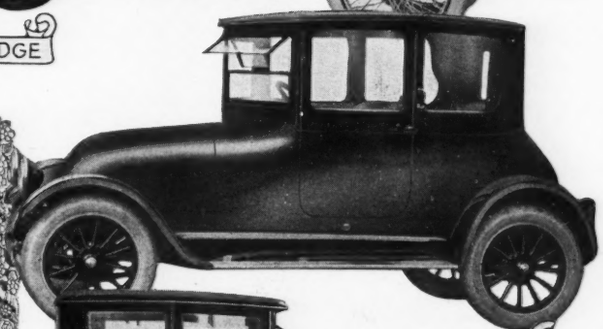
BUICK E-Six-46



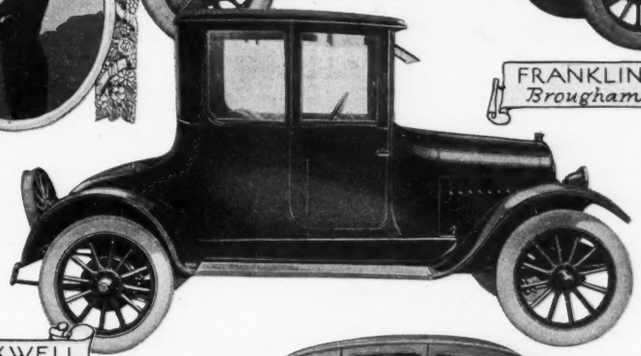
CHANDLER



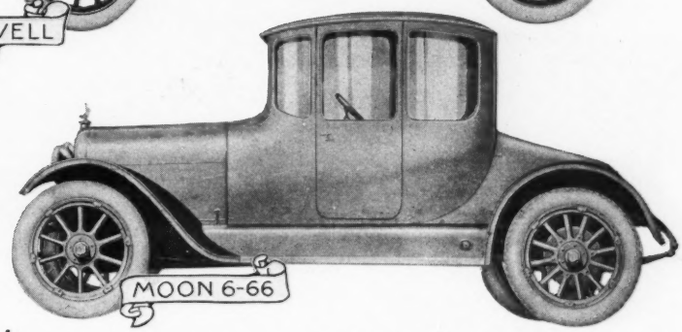
DODGE



FRANKLIN 9
Brougham



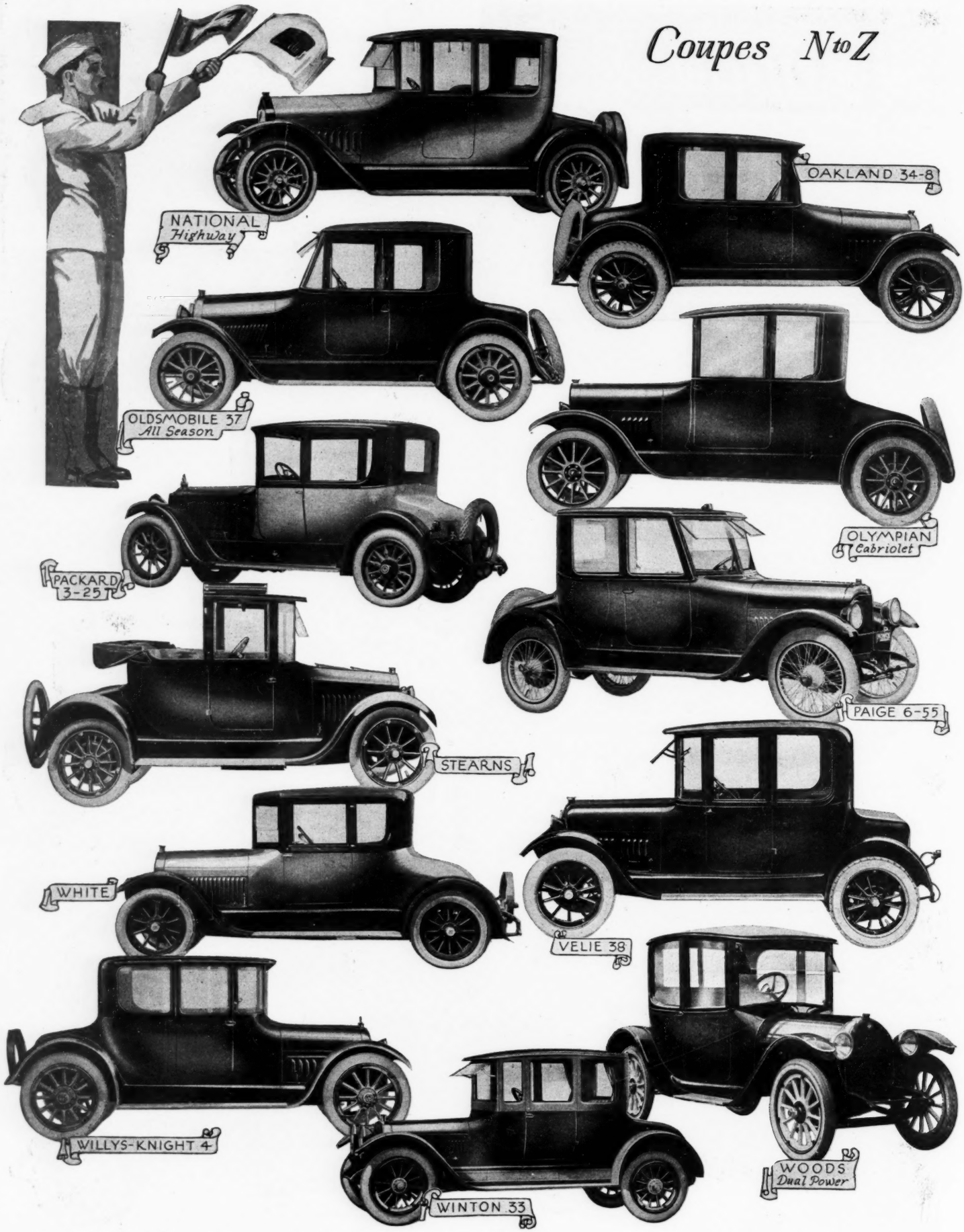
MAXWELL
25



MOON 6-66

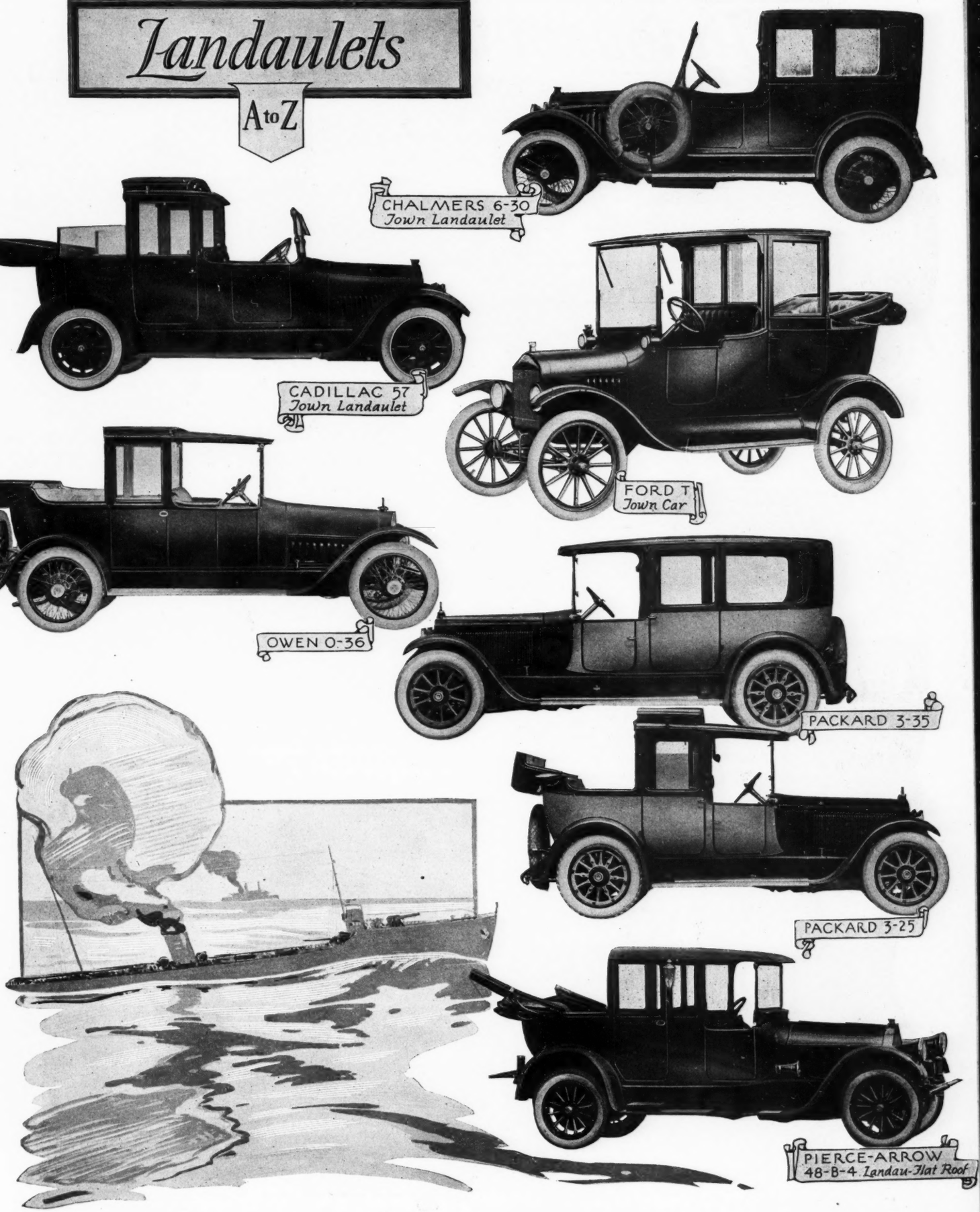
Prices and Specifications of all cars illustrated on this page appear on pages 68 to 80 of this issue.

Coupes N to Z



Prices and Specifications of all cars illustrated on this page appear on pages 68 to 80 of this issue.

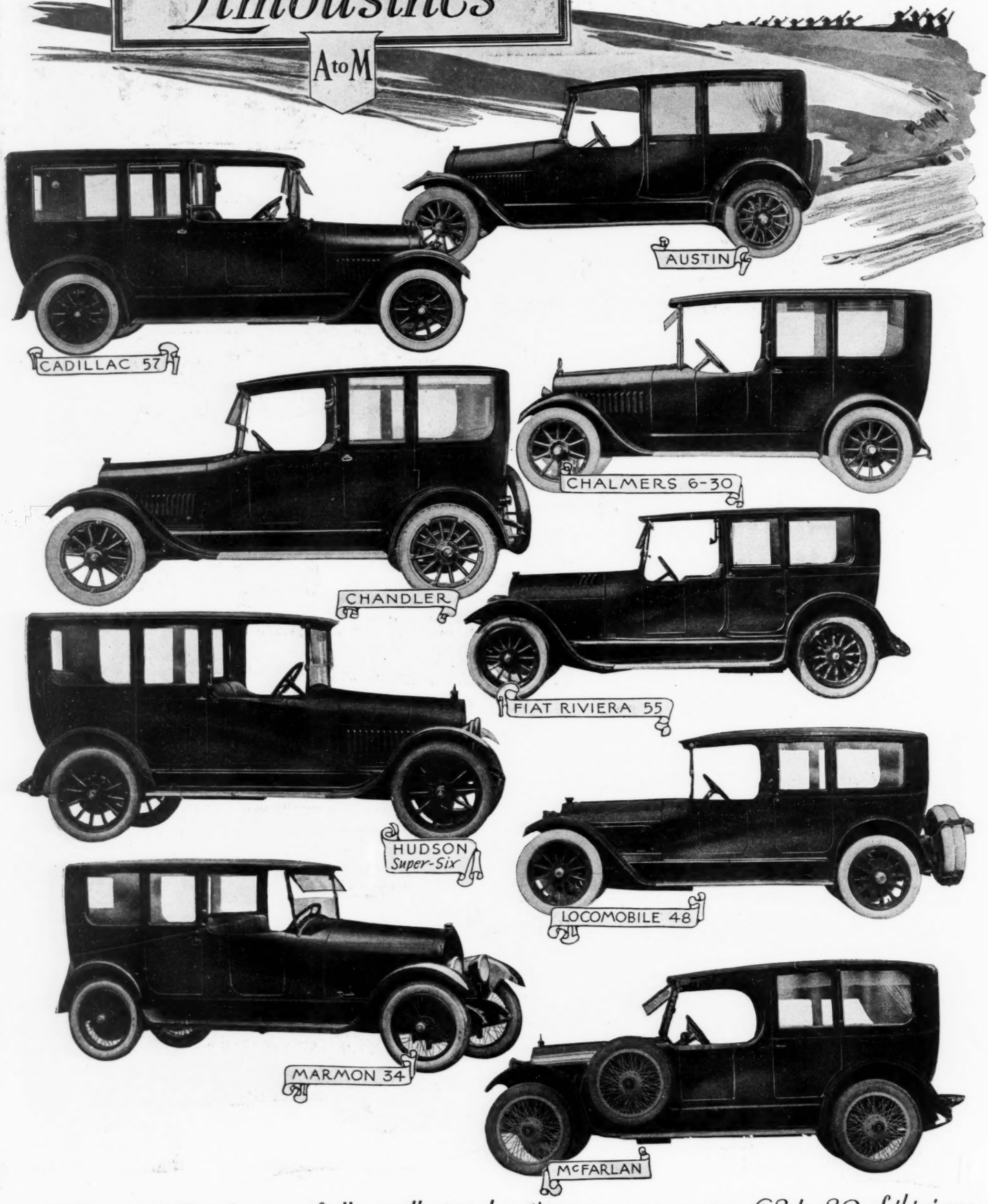
Landaulets A to Z



Prices and Specifications of all cars illustrated on this page appear on pages 68 to 80 of this issue.

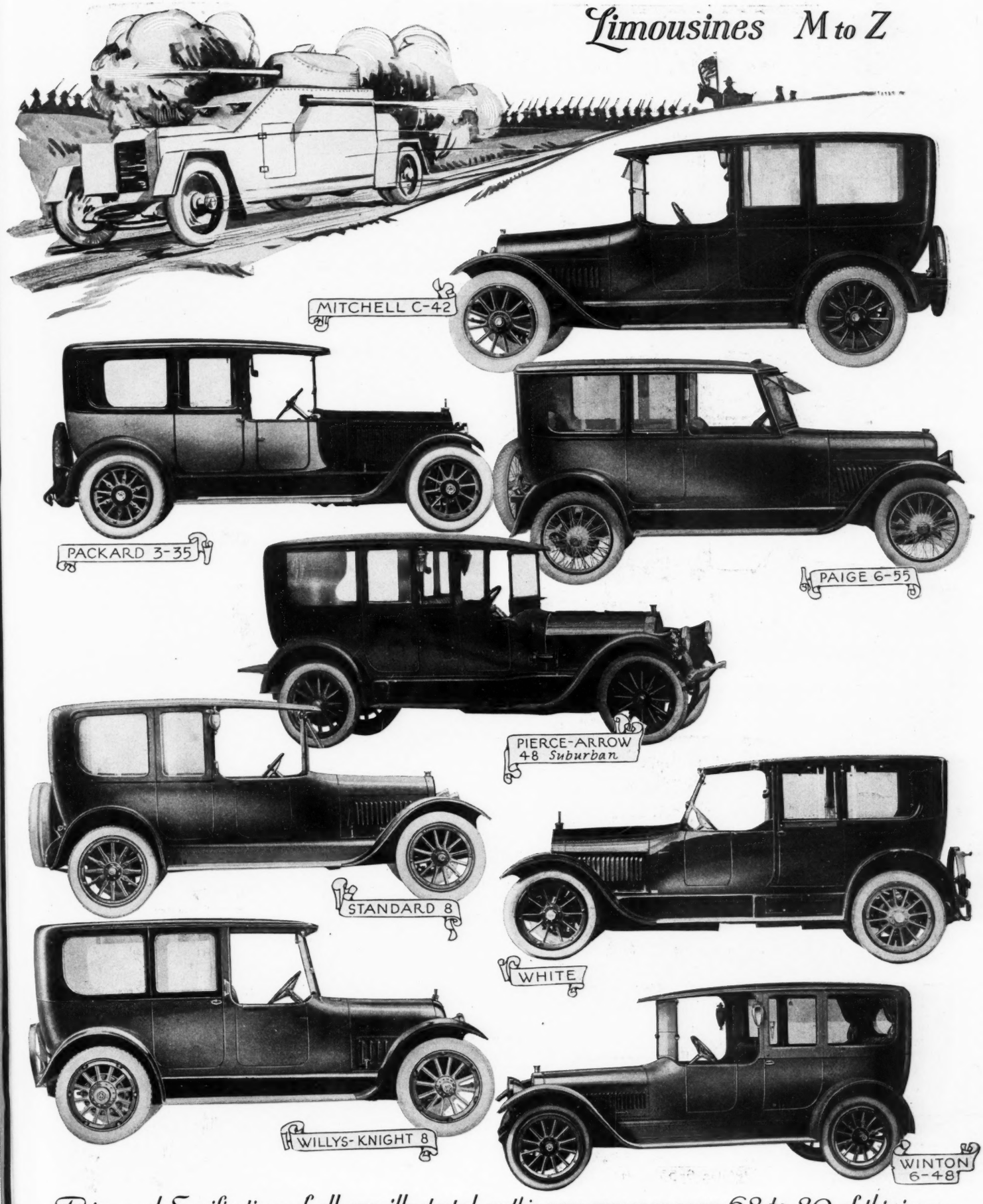
Limousines

A to M



Prices and Specifications of all cars illustrated on this page appear on pages 68 to 80 of this issue.

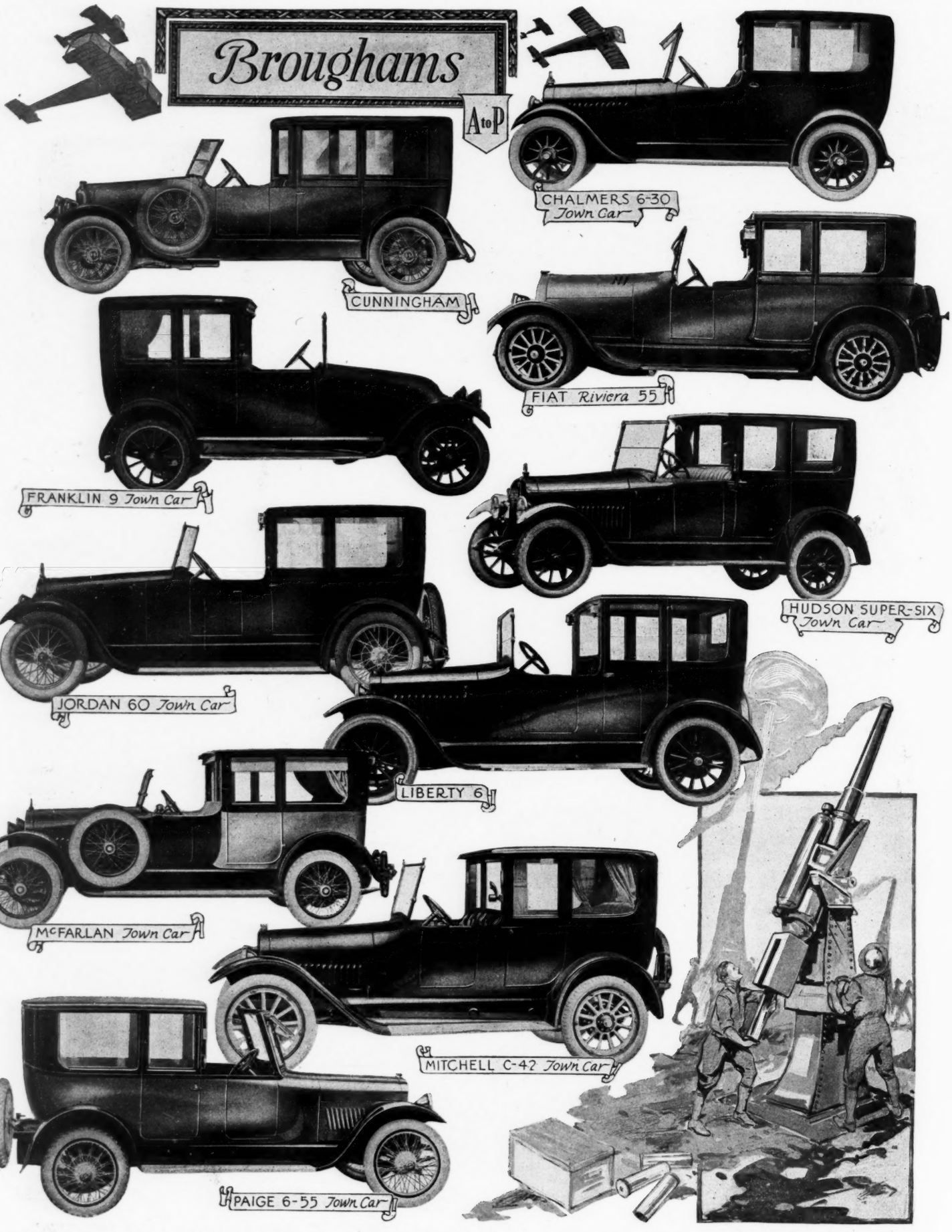
Limousines M to Z



Prices and Specifications of all cars illustrated on this page appear on pages 68 to 80 of this issue.

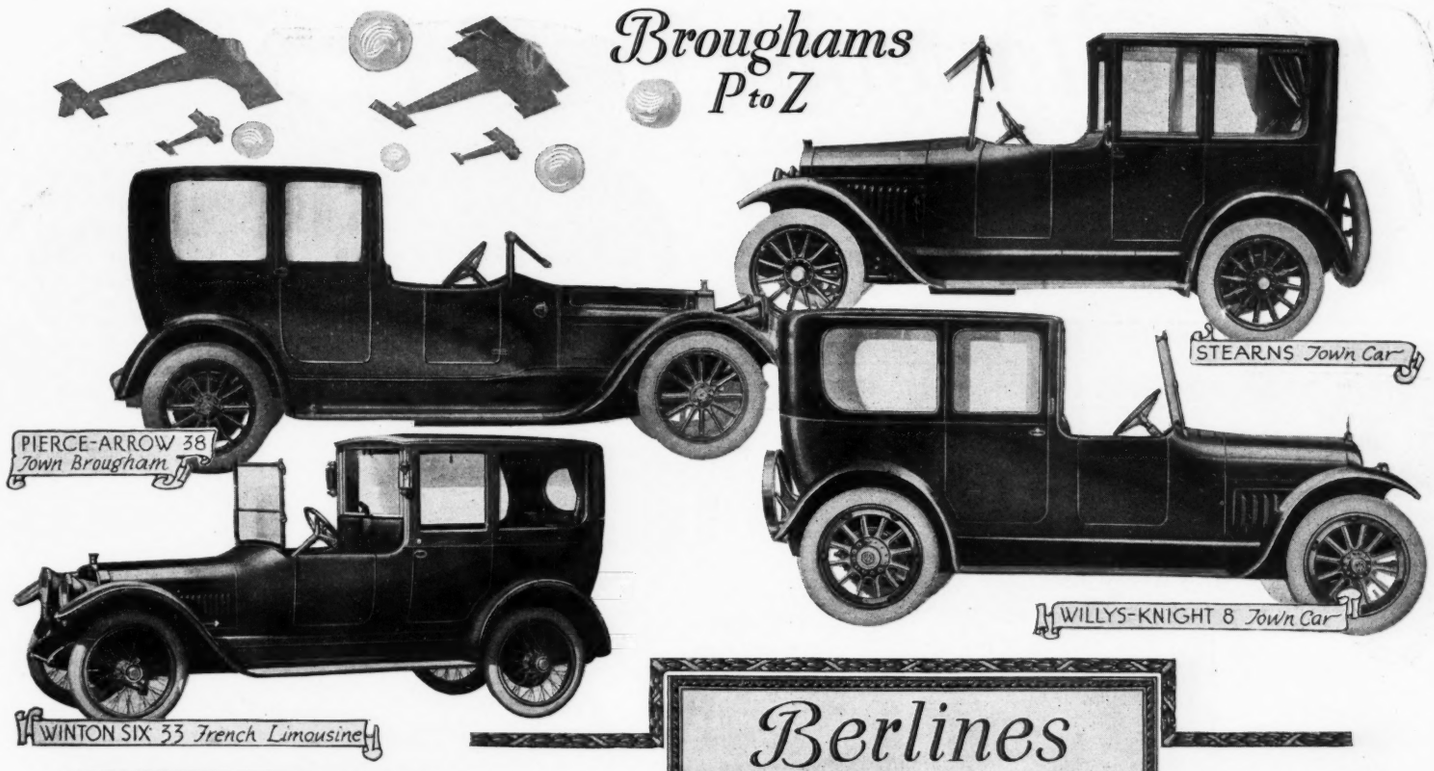
Broughams

A to P

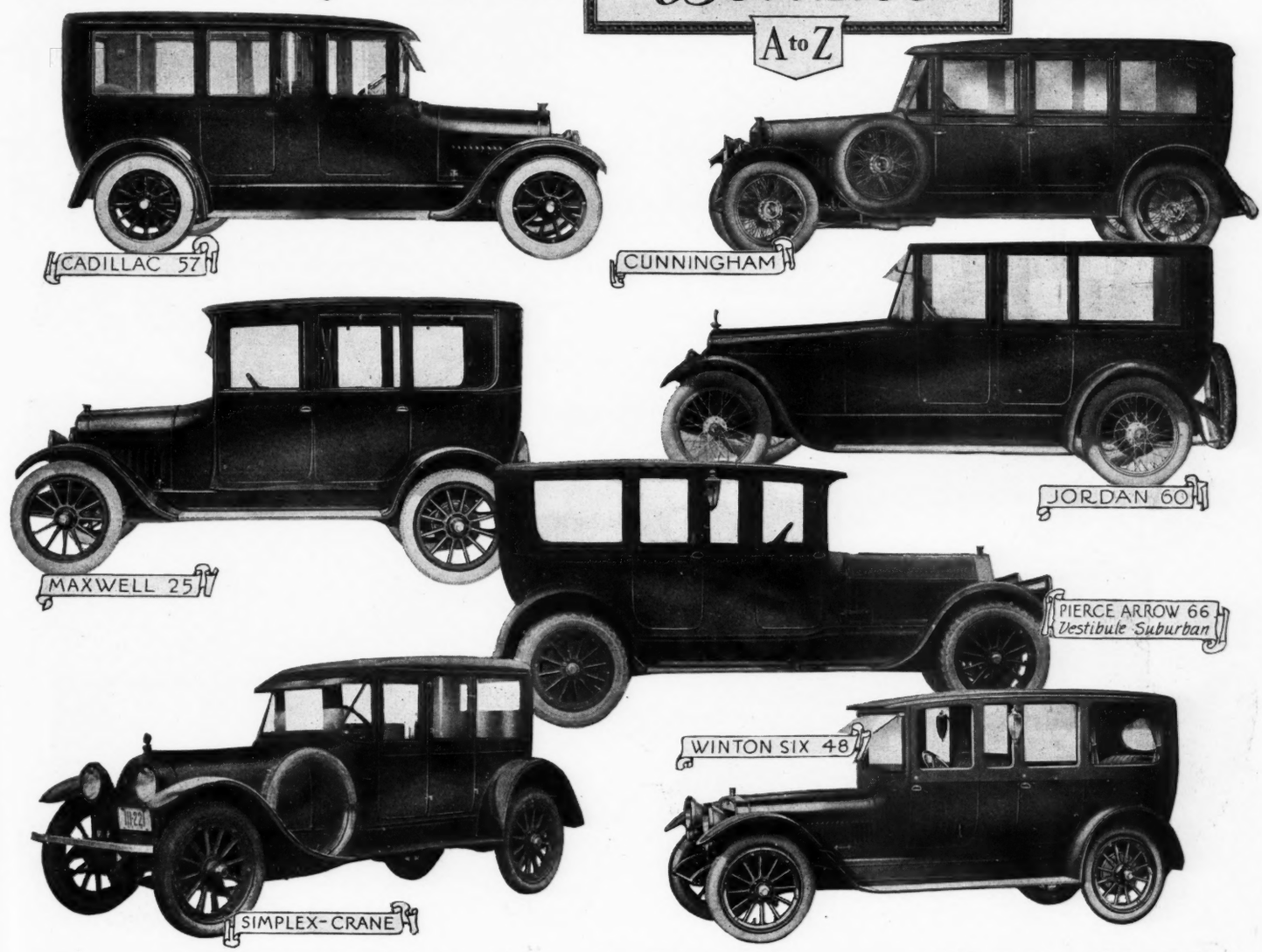


Prices and Specifications of all cars illustrated on this page appear on pages 68 to 80 of this issue.

Broughams P to Z

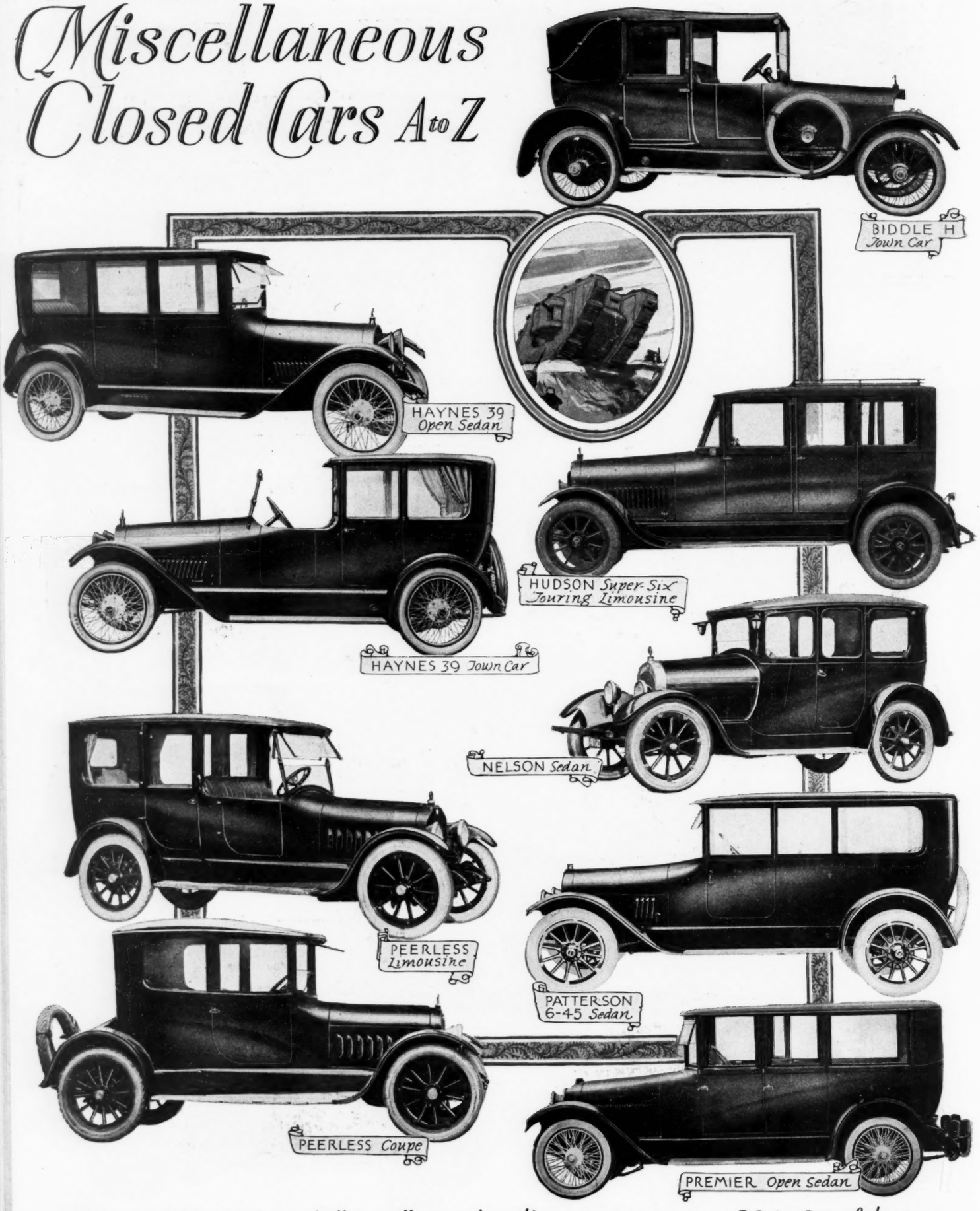


Berlines A to Z



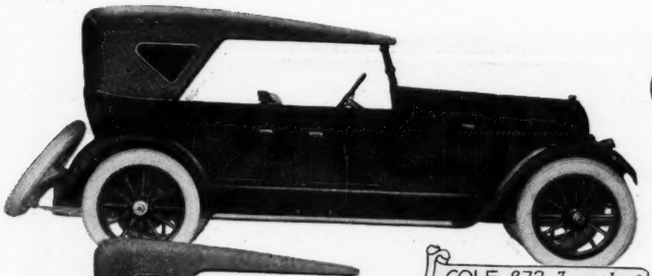
Prices and Specifications of all cars illustrated on this page appear on pages 68 to 80 of this issue.

Miscellaneous Closed Cars A to Z

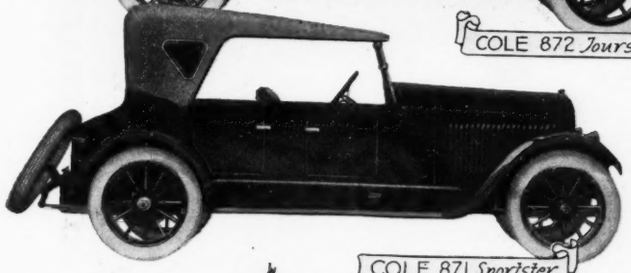


Prices and Specifications of all cars illustrated on this page appear on pages 68 to 80 of this issue.

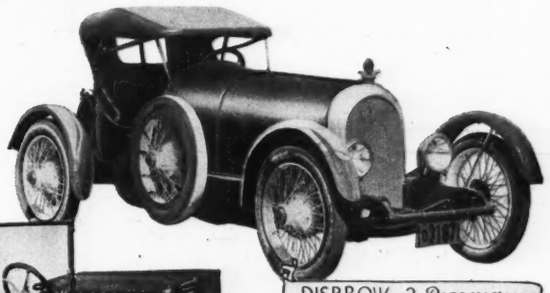
Open Cars
Too Late to Classify
A to Z



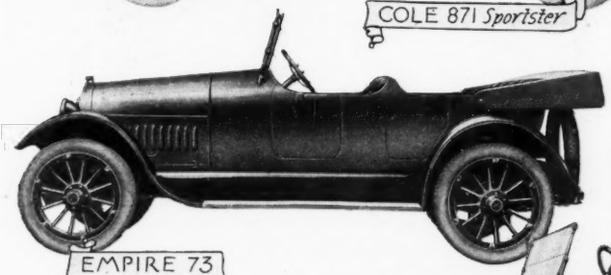
COLE 872 Jourster



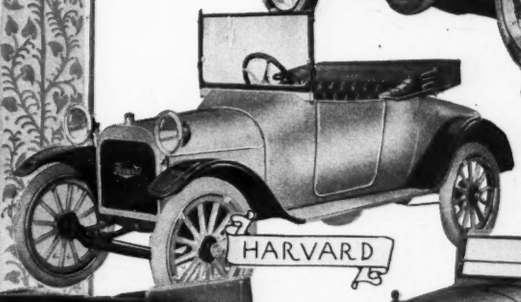
COLE 871 Sportster



DISBROW 2-Passenger

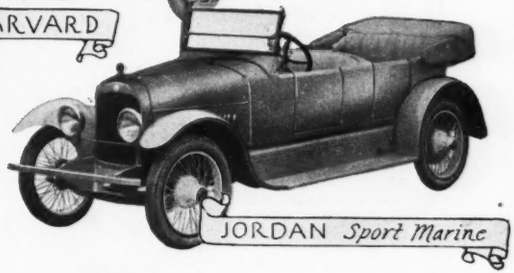


EMPIRE 73

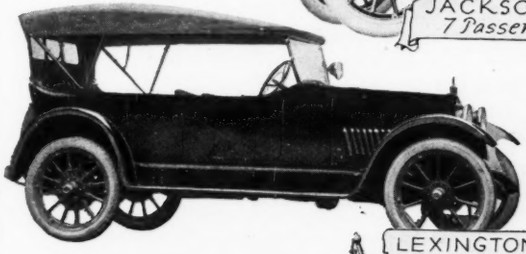


HARVARD

JACKSON Wolverine 7 Passenger

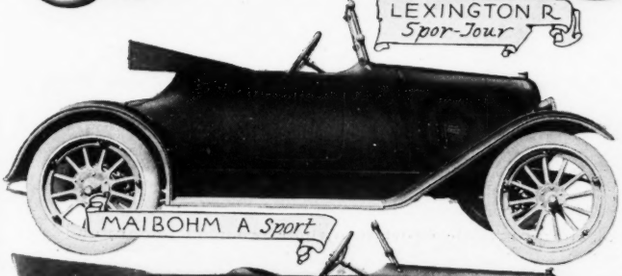


JORDAN Sport Marine

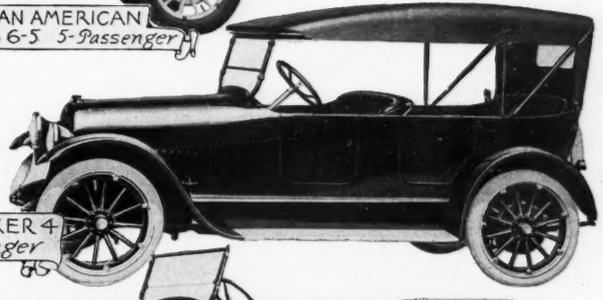


LEXINGTON R Spor-Jour

PAN AMERICAN G 6-5 5-Passenger

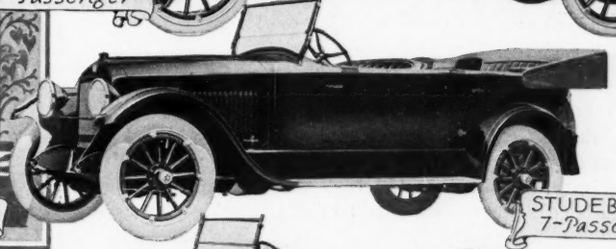


MAIBOHM A Sport

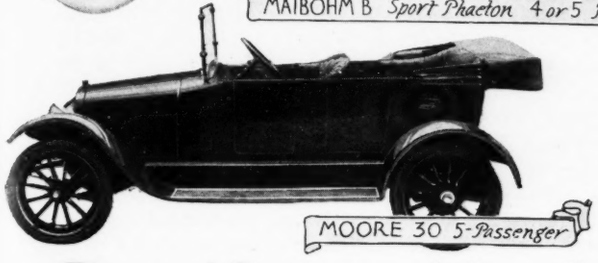


STUDEBAKER 4 5-Passenger

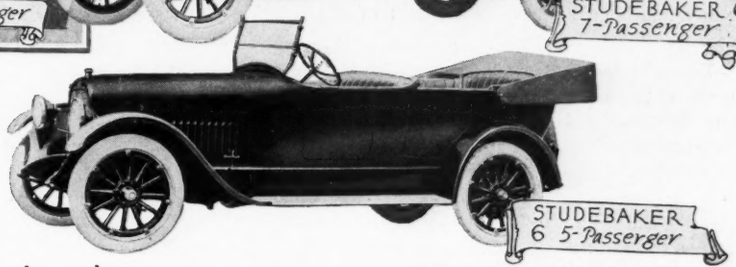
MAIBOHM B Sport Phaeton 4 or 5 Passenger



STUDEBAKER 6 7-Passenger



MOORE 30 5-Passenger



STUDEBAKER 6 5-Passenger

Prices and Specifications of all cars illustrated on this page appear on pages 68 to 80 of this issue.

Harmony in the Car Interior

By Ruth Sanders

The arrangement of auxiliary seats in the car is more than a small part of the car interior's design. How Hudson handles them sometimes is demonstrated in this simple, dignified interior

Imported tapestry with a small floral design is used with fitting accompaniments in window and fitment for this Holbrook body, and the result is an interior that harmonizes throughout

WITH greater mechanical perfection in the car has come closer harmony in the car interior. The interior has become more finished as a whole and more worthy of the technical skill spent with almost prodigal generosity on making the car better from the standpoint of body as well as engine and fundamental structure.

While each maker strives to attain a certain individuality for the closed cars bearing his mark as originator, all have more or less in common the effect of harmony in the interior. That is to say, attention is directed to the smaller points as well as to the broad lines, to the fit of the carpet as well as to the upholstering of the cushions, to the design of the lighting devices as well as to the standard vanity case or smoking outfit.

Dignity in Simplicity

The general tendency is toward the dignity of simplicity, as noted in the corresponding issue of last year. This has been made more apparent even in the months since. And it is through this simplicity, which gives the really great dignity, that harmony has been made a constituent of the interior of the closed car.

You will find that the majority of folks—men and women both, most of them anyway—prefer the simple things, that are really the most expensive, provided they have the leisure and money to give free rein to their choice. It is the same way with the car owners. The majority chose quiet colors and simple, though rich, materials. Tapestry, plush, broadcloth, mohair plush and figured worsted, some with velour and others with a hard, plain finish, the tapestry in most cases with small figures and dull and rich colors—these are the materials which make other than simplicity unnecessary and simplicity itself most desirable.

As to color there is, as ever, a wide range, something for every owner's taste. And, if you will but notice, you will find few of the flamboyant, riotous colors which the exterior of the car sometimes masquerades in within the car. Blues, grays and greens predominate. The grays range from the lightest of silver grays to the coldest of steel grays. There is a feeling of intense refinement about a black car with an interior fitted simply and naturally in a gray. Real artistic arrangement is necessary to deal with this arrangement, but the makers are putting the required skill and artistic effort into their products to-day, and the result is becoming more and more evident in the growth of the closed car's desirability as a work of true art.

On the other hand there is no reason for the owner who cares for color in its purity to feel that he or she will have brought loudness or conspicuousness on his or her self by indulgence in that feeling for color. The occasional car of crimson or yellow with here and there a car of blue with vermilion wheels is no more out of place than the bright plumage of a bird of the tropic forests. It requires skill to keep the colors in harmony if in their intense shades, but this skill is by no means lacking in the makeup of the motor car.

All, moreover, have the keynote of simplitcy, than which there is no more direct road to dignity and beauty. All trimming, except the necessary lighting fixtures, robe, pillow and vanity box, with here and there a door handle or window adjustment, has been eliminated with a view to laying bare the first principles of design in their inherent beauty of line and shades. Just as most of the makers are confining the next year's line to one in which refinements are the most evident marks of notice, so are the car

interiors embodying refinements such as a better design for the dictograph, more attention to the ever-present vanity box or more subtle skill in affixing the light dome in its proper plane of attention.

After all a motor car is much like a home. We spend our time and money, even the poorest of us, in methods and materials for making a pleasing interior. We use it in all weathers. We have an attachment for it. We live in it. And we want it to be a home in every sense of the term, with conveniences, fixtures and equipment distinctive to a home. The interior decoration of cars is based on the same idea. The doors and windows are wide, the running boards are low and broad enough for easy entrance and departure. The evening coat of the woman and the heavy overcoat of the man can enter the closed car with as little inconvenience as when crossing the threshold of the home.

Taste makes for harmony in the car interior perhaps more than any one feature, though taste might be defined as part of the fundamental basis of good design. The maker engages the tried-and-found-unwanting interior decorator and designer, and the result is what would be expected. This make of closed car bears the honor of having its interiors designed by Elsie de Wolfe. That one pays homage to Lady Duff-Gordon, or Lucille. The appointments are worked out as carefully in detail as is the upholstery. The vanity case is of a design in harmony with the rest of the fittings. The smoking set is a part of the general scheme. Silk shades which harmonize exactly with the material used in upholstery are fitted to the windows. Silk arm straps and cushion rests are provided.

A good deal of attention is paid to the window design. While this comes more directly under the sway of the body design, the results have much to do in making the car interior what it is. The windows are large as a rule, and an effort is made to have them of the type that will not interfere with the vision of those within the tonneau. For instance, the windows that let down may be of the frameless type, so that when they are half lowered there is no frame to form a bar across the outlook.

Unusual electric lighting effects are to be noted as most striking in the general design of the car interior. Perhaps the dome will be flush with the ceiling and, except at second glance, unapparent. Or, if it is not flush it will be of a design that is a thing of beauty in itself, something even the most casual glance will be glad to catch.

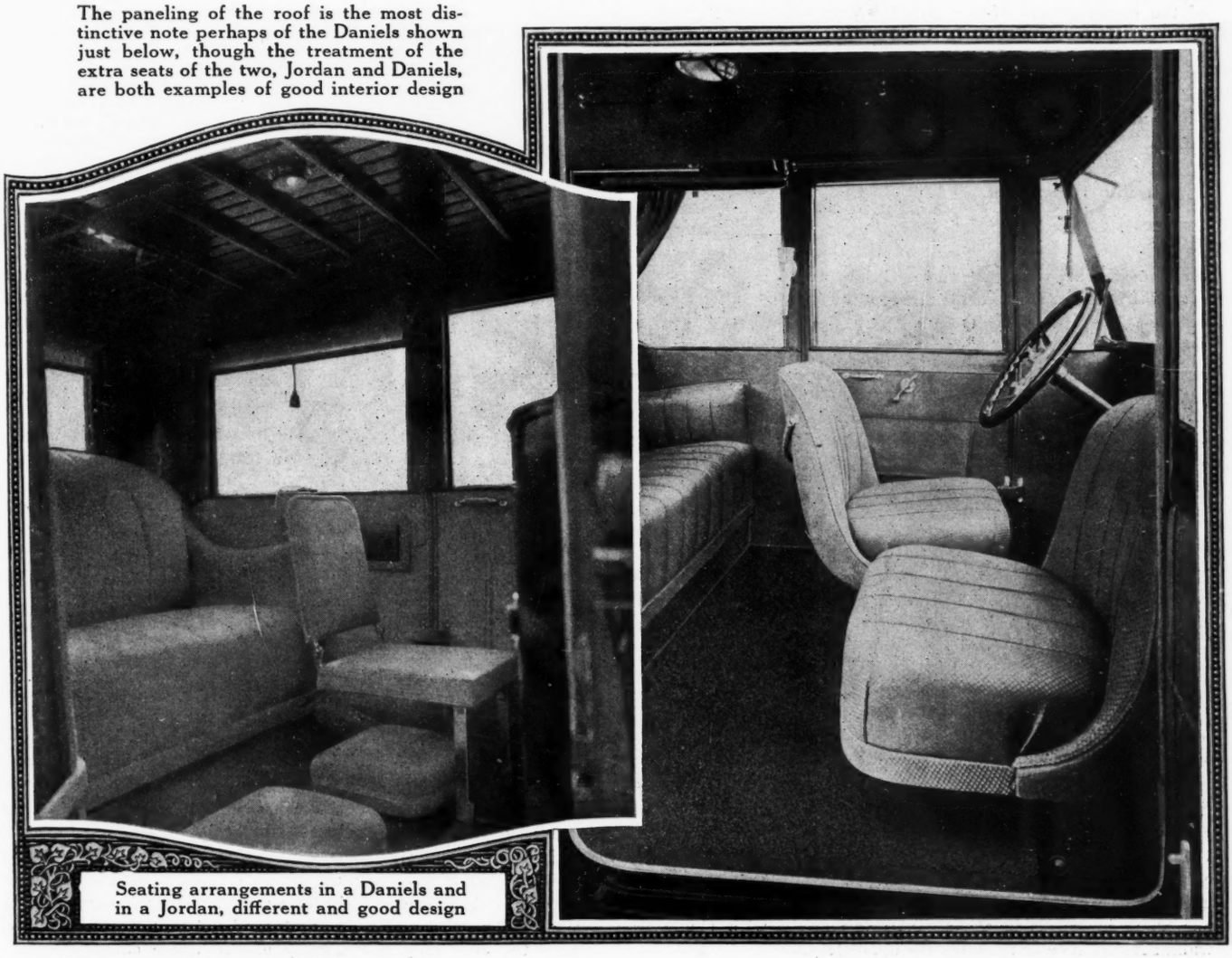
Telephone Conveniences Present

Means of communication with the driver are modern in the highest sense. To-day one may talk to the driver from the rear compartment without raising the voice above an ordinary conversational tone. Sometimes it is a telephone that furnishes the intermediary, the instrument fitting into a small compartment when not in use. Other times it is the simple disk of the dictagraph which rests practically flush in the side of the car.

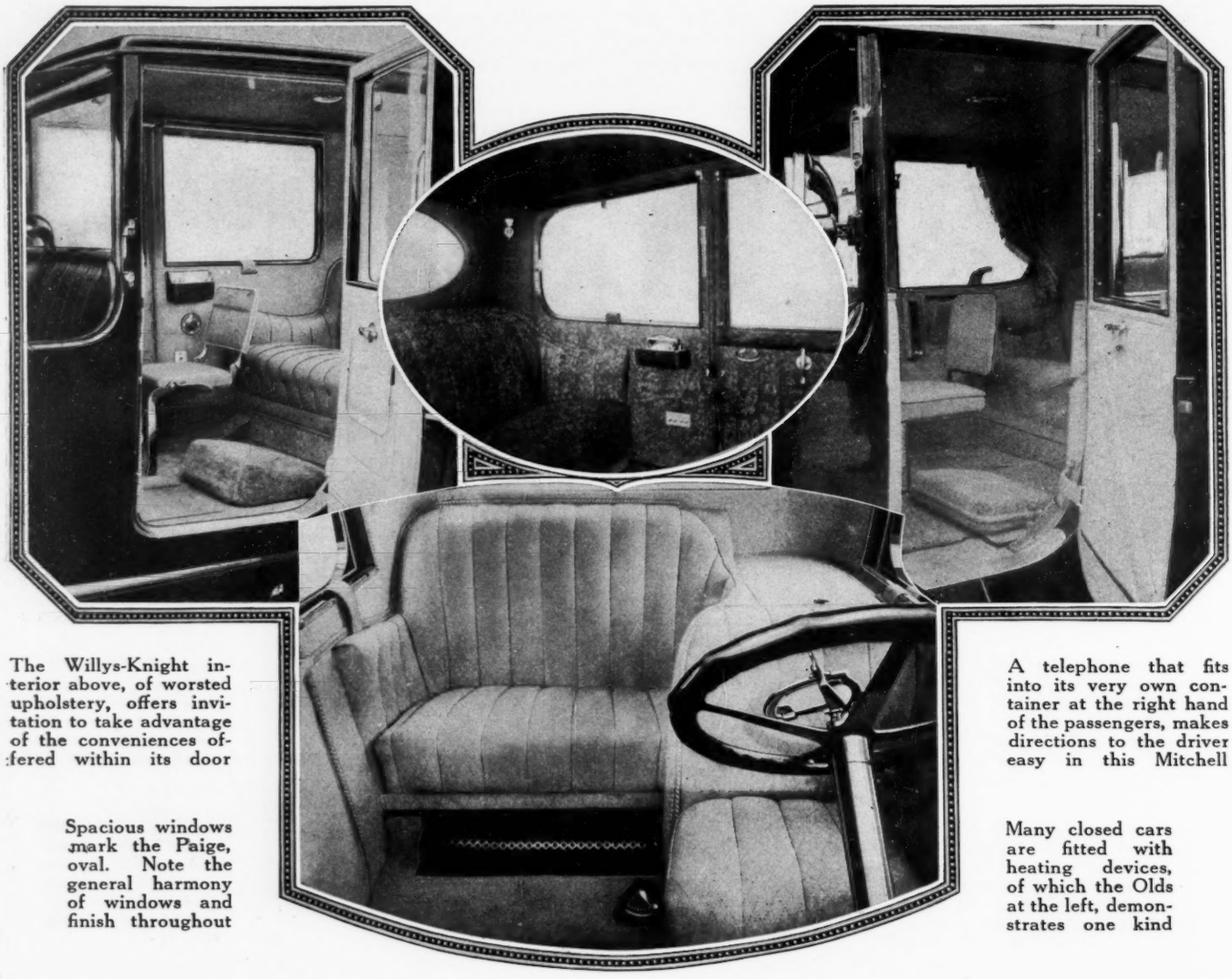
Then there are the fine details, such as a step light which turns off and on automatically by the opening and closing of the rear door to illuminate the entrance to the passenger compartment at night; the timepiece set in some convenient and unobtrusive part of the interior; and the extra compartment for spare wraps.

The sedan has been an accessory to the growth of car interior as a work of beauty. Differing somewhat from the closed car interior in that it is one which is more of a family affair with driver apt to be the owner in most cases, the principles of the in-

The paneling of the roof is the most distinctive note perhaps of the Daniels shown just below, though the treatment of the extra seats of the two, Jordan and Daniels, are both examples of good interior design



Seating arrangements in a Daniels and in a Jordan, different and good design



The Willys-Knight interior above, of worsted upholstery, offers invitation to take advantage of the conveniences offered within its door

Spacious windows mark the Paige, oval. Note the general harmony of windows and finish throughout

A telephone that fits into its very own container at the right hand of the passengers, makes directions to the driver easy in this Mitchell

Many closed cars are fitted with heating devices, of which the Olds at the left, demonstrates one kind

terior design are much the same. In the sedan we have the individual seat at the wheel, with sometimes a companion front seat that pivots about so that the passenger may face those in the rear. This is another mark of convenience to many owners, for the driver-owner can be with his guests without interrupting either the driving or trip. The simplicity of fittings, upholstering and so on are carried in these cases to the front of the car as well as in the tonneau. The same idea of beauty without ostentation remains.

Lines Are Emphasized

The lines of the interior are being emphasized more all the time. For this reason prodigal decoration is unnecessary. The lines of the interior have kept up with the body lines in this respect, and the body lines have been getting better each season until they deserve the best in the interior.

The making of the vanity cases and smoking sets for the closed car is now a fine art. In themselves they constitute a sign of the times as to the tendency toward simplicity rather than ostentation. Many of the cases are flush with the sides and covered with the same material as that with which the cushions are covered. In this way the cases are convenient and at the same time unnoticeable, something to be desired in line with the rest of the interior design. The more expensive cars contain more elaborate cases. The bottles and boxes in the vanity case are silver tipped, perhaps, and sometimes delicately colored. Walnut, mahogany, satin wood and ebony are used for the construction of the cases. Sometimes more than one wood is combined as in mahogany inlaid with ebony or walnut inlaid in color to match the upholstery.

One maker sets the dictagraph in the center of the vanity case, while another places the clock there. Usually the hardware corresponds in some way to the general scheme, through treatment of the metal or shape. The general idea seems to be, however, that the hardware should be kept as inconspicuous as possible, and in view of the effort to make the really artistic dome light disappear into the ceiling this should be done, as it takes a great deal to make door handles and whatnots other than useful.

Whipcord still is the standby for cloth upholstery, though, of course, other cloths are newer. The French pleating continues to predominate in treatment of the cushions, though smooth and tri-cushions are also prominent. In some cars the treatment of the cushions is the least important feature. The color or mere texture of the material used may overbalance any sanitary ideas as to whether French pleating or diamond tufting is best from the standpoint of hygienics.

Individual bodies, naturally, call for the height of attention to the interior. For example, consider the one from Holbrook illustrated here. This is the interior of a body built on a Crane Simplex chassis with Rolls-Royce hood and radiator. Consequently, much attention has been given to making the interior luxurious. You will notice, however, how simple the interior is. Its novelty lies in the installation of the dictograph, in the vanity case. The car is upholstered in biscuit-colored imported silk tapestry with blue floral design. Wood work, vanity case and dome light lens are maple stained to match the background of the material. This is considered by Holbrook to be one of the finest bodies it has turned out in a long time. Yet note the simplicity and dignity of the whole effect.

Much forethought and preparation underlies the striking plainness and beauty of some of the most beautiful interiors. The corners of the finishing molding around each of the windows in the Locomobile, for instance, are free from a single open joint caused by mis-matching of the two pieces brought together. The very corner is worked out in harmony with the rest of the interior, with as much as attention to the shape and line as to a piece of statuary. Finishing moldings around each window are made in one piece and from solid metal made specially for this. This is an expensive method of construction but gives an expression of unbroken continuity such as the flat welt design of lace and flatness and seamless arrangement of the fabrics for the large panels of the body walls. The cushion and back are built primarily for comfort but lend their share of the general agreement. Though the decorative value is by no means the supreme feature to consider in construction of body interiors, it is of the utmost importance nevertheless.

The closed car may be fitted with a heater as standard equipment. Olds calls attention to this in its closed car, using a combination heater and footrest, controlled by hand or foot. Then there are the comfortable easy chair types of front seats in the versatile sedan, which are so much a feature of sedan body interiors.

Many are the fittings which accompany the general decorative scheme. For example, the Chalmers town car, with its inlaid mahogany panels, finely wrought metal plated with silver, silver mounted and etched dome lights that suffuse the interior and steps as the door opens, includes the concealed toilet set for the women and the smoking set for men, a footstool and fabric-covered telephone, operated by a push button close at hand, a driver's buzzer and umbrella holder with drip. Two seats in the Maxwell berline illustrated here indicate one method of utilizing the extra seating capacity thus given without making the seats noticeable in their folding ability. The two seats fold into the middle partition, and when they are down and occupied, they are as stationary seats, that is, there is plenty of room and no one is crowded.

Details Are Observed

Makers may pride themselves on coach work. Interior molding joints are mitred accurately, and other details are worked out with equal care. The roofs and window frames in interiors may be entirely without joints, hinges on the full length doors mounted against concealed rubber cushions, rolls of live rubber, covered with velvet, binding the door openings and making the closed doors weather-proof. Rubber bumpers will soften the closing of the doors and serve to prevent rattles.

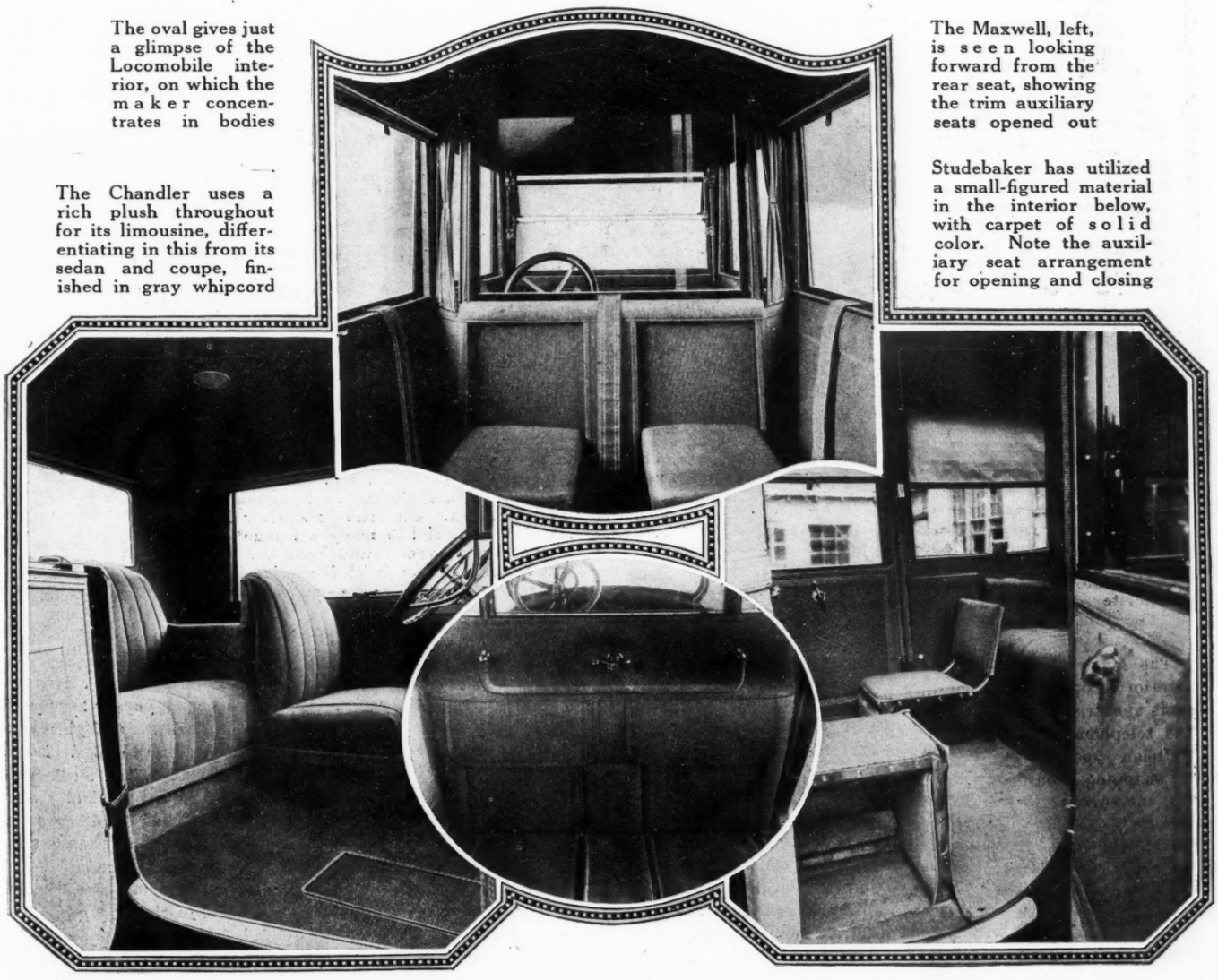
Paige makes one of its main objects individuality, and for this reason its interior designs are worked out with the same idea of luxury, harmony and care as to detail such as is in the home. Chandler uses the serviceable and pleasing gray whipcord in its sedan and coupe, while a rich plush is used throughbut for the limousine interior. Willys-Knight upholsters its coupe in rich gray-blue worsted with soft gray carpet, its sedan in gray striped worsted with gray top lining and carpet to match, and the town car, the Willys-Knight ultra-luxurious type of body, in fawn-colored worsted with top lining, thick carpet and silk window shades to match.

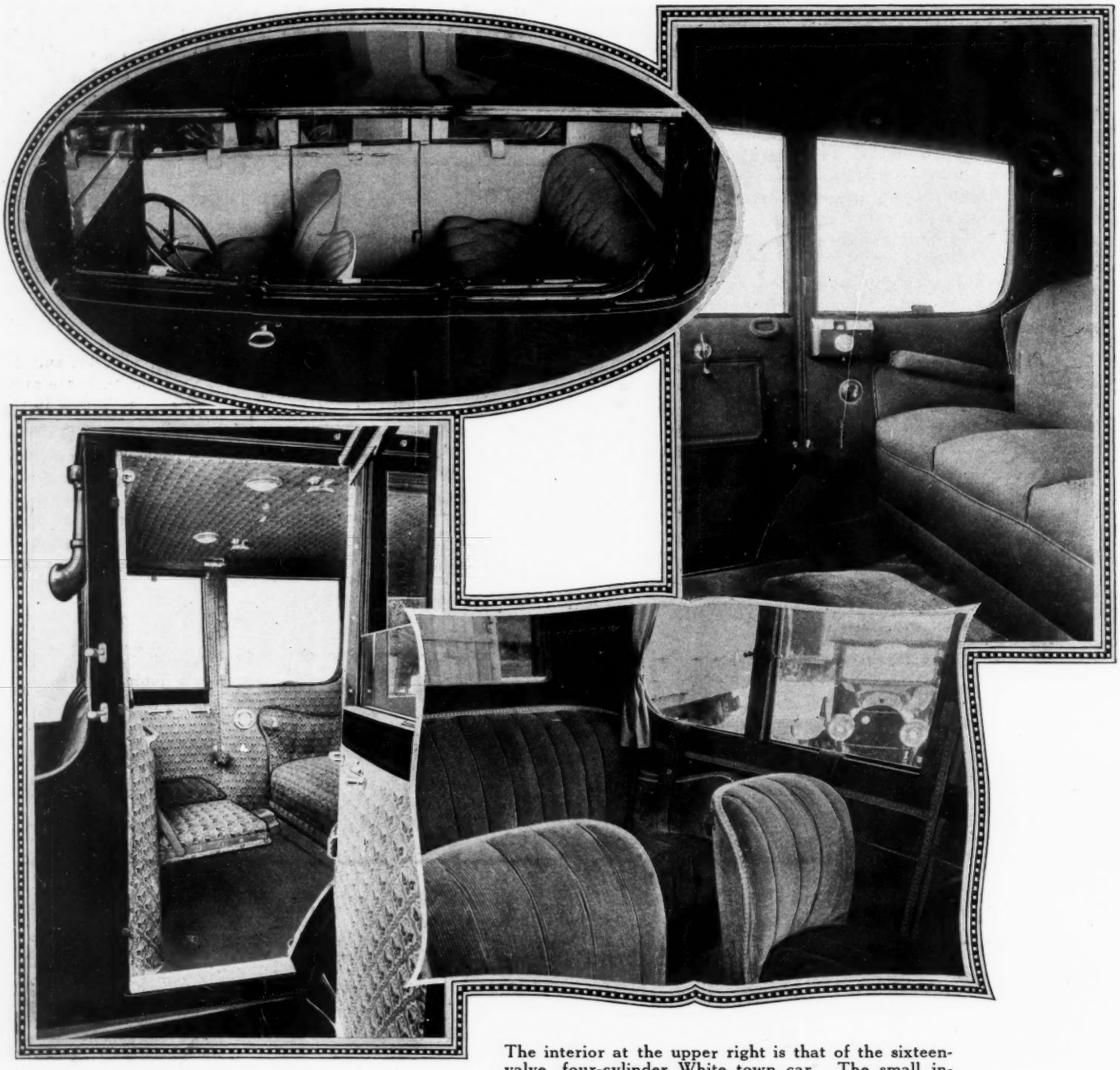
The oval gives just a glimpse of the Locomobile interior, on which the maker concentrates in bodies

The Chandler uses a rich plush throughout for its limousine, differentiating in this from its sedan and coupe, finished in gray whipcord

The Maxwell, left, is seen looking forward from the rear seat, showing the trim auxiliary seats opened out

Studebaker has utilized a small-figured material in the interior below, with carpet of solid color. Note the auxiliary seat arrangement for opening and closing





The oval view of a Dodge Brothers interior gives a good idea of the seating arrangement in a convertible sedan, which lends its interior for decoration and at the same time is a car for all weathers and seasons. The Chalmers just below it is one of the interiors designed by Lady Duff-Gordon and combines finish of upholstery with attention to the details of lighting, corners and other fine points

The interior at the upper right is that of the sixteen-valve, four-cylinder White town car. The small instrument on the side is a dictagraph. Note the heavy upholstery and arm rest. The one just below it is a KisselKar interior. Kissel has made a feature of its interiors combined with year-round bodies, and this is an excellent example. The finish is serviceable and in excellent taste for everyday and so-called opera use

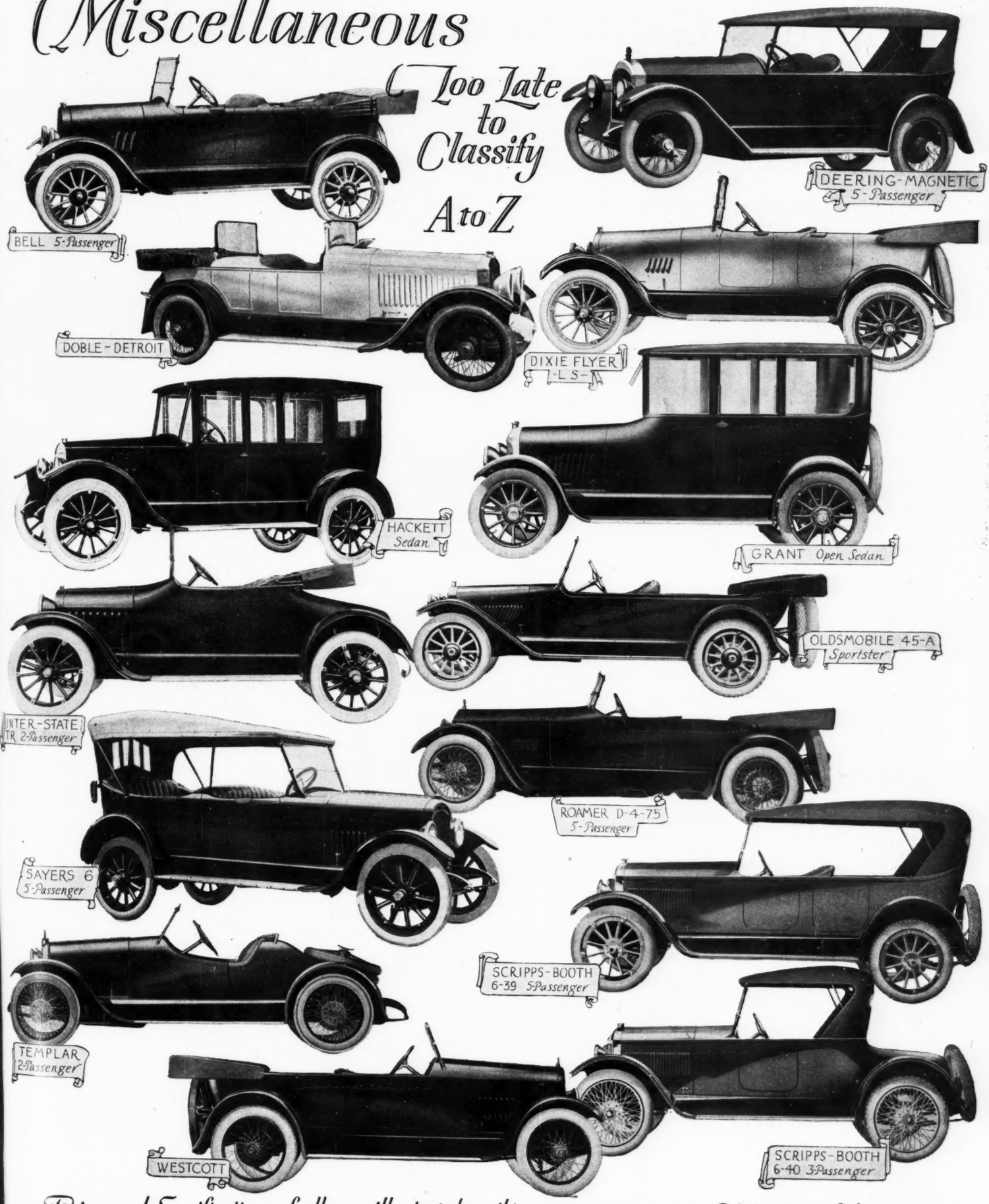
The Hudson interior illustrated is from its town car, with interior designed in all simplicity and dignity, with auxiliary seats unobtrusive and smooth finish throughout. Mitchell places the telephone in a compartment of its own and supplies the Pullman type of lights, while the dome light can be arranged by snapping a button to light when the door is opened. Here, too, the curtains match the upholstery.

Jordan, though practically a newcomer in the field, has from the start made a feature of its interior work, while Daniels and White have been well known in this line for some time. In the Dodge Brothers and Studebaker interiors here we have illustrations of two distinct types of interiors, Studebaker with the small-figured interior and Dodge Brothers in plain colors. Though different types, both are examples of thought in interior design.

We are told that the art of coach building—and this would include interior decoration—began away back yonder 2000 years before the Roman empire was formed. No traces of glass windows or complete door seem to have existed up to 1650. In the reign of Louis XIV, which lasted until 1715, the most rapid progress in coach building was made, and a beautiful carved and paneled piece of cabinet work developed to deserve the name of coach. Gilding and painting was introduced, and beauty of shape was noted. The inner linings were of brocaded silk or velvet. And with the twentieth century came new stimulus to coach building—the motor car. This is just a brief glimpse of the extent to which the art of coach building has been developed. As attention centers on body design the interior also develops and keeps step with the mechanical improvements of the car.

Miscellaneous

Too Late to Classify A to Z



Prices and Specifications of all cars illustrated on this page appear on pages 68 to 80 of this issue.

Buyer's Guide to Car Body Styles

The prices given here are the latest list prices, most of them for Jan. 1, but are subject to change. Illustrations of bodies listed are to be found on the pages shown in the last column. Where no page reference is given the particular body referred to is not illustrated. The N. A. C. C. (old S. A. E.) horsepower rating is given in the column that is headed "HP."

Seven-Passenger Touring Cars

NAME AND MODEL	PRICE	CYL.	HP.	W.B.	TIRES	ILL. ON PAGE
Abbott, 6-62	....	6	29.40	122	34x4	..
Anderson, 20	....	6	25.35	120	33x4	..
Apperson, 8-18-7	$2550	8	33.80	130	38x4	44
Apperson, 6-17-7	2200	6	29.40	130	35x4½	..
Auburn, 6-44	1685	6	29.40	131	35x4½	44
Buick, E-Six-49	1495	6	27.34	124	34x4½	44
Cadillac, 57	2805	8	31.25	125	35x5	45
Case, U	1875	6	29.40	125	35x4½	45
Chalmers, 6-30	1535	6	25.35	117	34x4	45
Chandler, 25	1595	6	29.40	123	34x4	..
Chandler, 17-B	....	..	.....	...	....	45
Cole, 870, Tourster	2395	8	39.20	127	35x4½	45
Cole, 860	1995	8	39.20	127	35x4½	..
Crawford, 18-6-40	2250	6	29.40	122½	32x4	..
Cunningham, 6-pass.	4750	8	45.00	132	37x5	..
Davis 6, J-18	1785	6	29.40	125	34x4½	45
Davis 6, H-18	1485	6	25.35	119	34x4	..
Deering-Magnetic	3750	6	38.40	132	33x5	..
Dispatch, G	1250	4	22.50	120	36x3½	45
Dorris, I-C-6	2785	6	38.40	130	36x4½	45
Empire, 70-A	1375	6	25.35	120	34x4	45
Fiat, E 17	5500	4	44.10	140	35x5	..
Fiat, 55	5500	4	44.10	140	35x5	45
HAL Twelve, 25	3600	12	39.68	135	....	45
Haynes, 39	1825	6	29.40	127	35x4½	45
Haynes, 44	2785	12	36.30	127	34x4½	..
Hudson Super-Six	1950	6	29.40	125½	32x4½	45
Jackson, Wolverine	1570	8	28.80	118	37x4	61
Jones, 26 A B	1675	6	29.40	125	34x4	46
Jones, 26 A B Victoria	1775	6	29.40	125	34x4	..
Jordan, 60	1995	6	29.40	127	35x4½	46
King, 8 EE	....	8	28.80	120	34x4	46
KisselKar, Double-Six	2250	12	39.68	...	34x4½	46
Lexington, R	....	6	25.35	122	34x4	46
Locomobile, 48	5950	6	48.60	142	37x5	46
Locomobile, 38	5000	6	43.35	139	36½x4½	..
Marmon, 34	3550	6	33.75	136	32x4½	46
Marion-Handley, B-6-60	1850	6	29.40	125	35x4½	..
McFarlan, Six	3500	6	48.60	136	35x5	46
Moline-Knight, G	1985	4	25.60	122	35x4½	46
Moline-Knight, G. De Luxe	2250	4	25.60	122	35x4½	..
Mitchell, C-42	1525	6	29.40	127	34x4	46
Moon, 6-66	1850	6	29.40	125	35x4½	46
Moon, 6-45	1685	6	25.35	125	34x4	..
Murray	2800	8	33.80	128	34x4½	..
Nash, 671	1465	6	29.40	125	34x4	46
National Highway, 6	1995	6	29.40	128	34x4½	46
National Highway, 12	2595	12	39.68	128	34x4½	46
Oldsmobile, 45-A	1467	8	26.45	120	34x4	46
Owen-Magnetic, W-42	5300	6	38.40	142	35x5	..
Owen-Magnetic, O-36	3950	6	33.75	136	35x5	46
Packard, 3-25	3700	12	43.20	128	35x5	47
Packard, 3-25, Salon	3700	12	43.20	128	35x5	..
Packard, 3-35	4100	12	43.20	136	35x5	..
Packard, 3-35, Salon	4100	12	43.20	136	35x5	47
Paige, 6-55	1775	6	29.40	127	35x4½	47
Pan-American, J-7	1885	6	29.40	128	33x4½	..
Paterson, 6-45	1295	6	25.35	120	32x4	..
Peerless, 56	2340	8	33.80	125	35x4½	..
Pennsy, 6-18	1425	6	25.35	120	33x4	..
Pierce-Arrow, 48-B-4	5500	6	48.60	142	35x5	..
Pierce-Arrow, 66-A-4	6500	6	60.00	147½	36x5½	..
Premier, 6C	2285	6	27.34	125½	32x4½	47
Reo, M	1385	6	22.16	126	34x4½	47
Singer	3800	6	38.40	139	35x5	..
Standard, S-G	2450	8	33.80	127	34x4½	47
Stearns, SKL 4	1785	4	22.50	119	34x4	..
Stearns, SK 8	2575	8	33.80	125	35x4½	47
Studebaker, 6	1695	6	36.04	126	33x4½	61
Stutz, S	2750	4	30.63	120	32x4½	..
Velie, 39	1595	6	29.40	124	33x4½	47
Westcott, 18	1940	6	29.40	125	35x4½	47
White, GM	5000	4	28.90	137½	35x5	47
Willys Six, 89	1365	6	29.40	120	33x4½	..
Willys-Knight, 88-4	1525	4	27.23	121	34x4½	..
Willys-Knight, 88-8	2000	8	36.45	125	34x4½	47
Winton Six, 33	3000	6	33.75	128	36x4½	..
Winton Six, 48	3500	6	48.60	138	37x5	47
Yale, 8	1975	8	28.80	126	34x4	..

Six-Passenger Touring Cars

Austin	$3750	12	39.68	142	34x4½	44
Cunningham	4750	8	45.00	132	37x5	45
Daniels, S	3100	8	33.80	127	34x4½	45
Locomobile, 38	5000	6	43.35	139	36½x4½	..
Locomobile, 48	5950	6	48.60	142	37x5	46
Stutz, S	2750	4	30.63	120	32x4½	47
Winton Six, 33	3000	6	33.75	128	36x4½	..
Winton Six, 48	3500	6	48.60	138	37x5	..

Five-Passenger Touring Cars

NAME AND MODEL	PRICE	CYL.	HP.	W.B.	TIRES	ILL. ON PAGE
Allen, 41	$1095	4	22.50	112	32x3½	34
American, 6-B	1375	6	23.44	122	32x4	34
Anderson, 20	1435	6	25.35	120	33x4	..
Arbenz	725	4	16.90	108	30x3½	..
Auburn, 6-39	1395	6	25.35	120	34x4	34
Bell	995	4	25.60	114	32x3½	67
Bour-Davis, 18-B	1650	6	29.40	118	33x4½	..
Bour-Davis, 18-A	1385	4	22.50	118	32x4	..
Brewster, I	7700	4	25.60	125	34x4½	34
Briscoe, 4-24	725	4	15.20	104	30x3½	..
Buick, E-Six-45	1265	6	27.34	118	34x4	..
Buick, E-Four-35	795	4	18.23	106	31x4	34
Campbell	835	4	24.03	110	30x3½	..
Chalmers, 6-30	1485	6	25.35	117	34x4	35
Chevrolet, D-4	1385	8	36.45	120	34x4	35
Chevrolet, 490	635	4	21.76	102	30x3½	35
Chevrolet, FA	935	4	21.76	108	33x4	35
Columbia, 6	1350	6	25.35	115	32x4	35
Comet, C-50	1285	6	29.40	125	33x4	..
Commonwealth, 4-40	995	4	19.60	112	32x3½	35
Crawford, 18-6-40	2250	6	29.40	122½	32x4	..
Crow-Elkhart, CE-36	935	4	19.60	114	32x3½	35
Crow-Elkhart, CE-36, DeLuxe	995	4	19.60	114	32x3½	..
Davis, 6 I-18	1485	6	29.40	125	34x4½	35
Dixie Flyer	995	4	16.90	112	32x3½	..
Dodge Brothers	885	4	24.03	114	32x3½	35
Dort	....	4	19.60	105½	30x3½	35
Elcar, 4	1095	4	19.60	116	32x3½	..
Elcar, 6	1295	6	25.35	116	33x4	35
Elgin	1095	6	23.44	117	32x4	..
Empire, 50	1125	4	24.03	115	33x4	35
Empire, 70-A	1345	6	25.35	120	34x4	..
Fageol, custom-built	....	6	60.00	...	34x4½	..
Fergus, chassis only	....	6	25.35	130	33x4½	..
Ford, T	360	4	22.50	100	30x3	35
Franklin, 9	2050	6	25.35	115	32x4	35
F.R.P., chassis only	....	4	33.86	140	36x4½	..
Geronimo, 6 A-45	1395	6	23.44	122	32x4	..
Geronimo	895	4	19.60	114	32x3½	..
Ghent, 6-60	....	6	29.40	125	34x4	..
Glide, 6-40	1495	6	23.44	119	34x4	35
Grant, G	1055	6	21.60	114	32x3½	36
Hackett, A-L	....	4	22.50	112	32x3½	..
Harroun	785	4	16.90	106	30x3½	36
Haynes, 38	1725	6	29.40	121	34x4	36
Hollier, 206	....	6	25.35	...	....	..
Hollier, 196	1085	6	21.60	116	32x3½	36
Hollier, 188	1285	8	28.80	116	34x4	..
Hupmobile, R	1250	4	16.90	112	32x4	36
Inter-State, T	1000	4	19.60	110	33x4	36
Jackson, 8, Wolverine	1495	8	28.80	118	37x4	36
KisselKar, 100-point	1295	6	25.35	117	34x4	36
Kline Kar, 6-38	1495	6	25.35	120	34x4	36
Lexington, R	1585	6	25.35	122	34x4	..
Liberty Six, 10-B	1350	6	25.35	115	32x4	36
Maibohm, B	975	6	23.44	115	32x3½	61
Marion-Handley, B 6-60	1590	6	29.40	125	35x4½	..
Marmon, 34	3500	6	33.75	136	32x4½	..
Maxwell, 25	745	4	21.03	109	30x3½	36
McFarlan, 125	3700	6	48.60	136	35x5	..
Metz, 25	695	4	24.03	108	32x3½	..
Mitchell, D-40	1250	6	25.35	120	32x4	36
Mitchell, C-42	1510	6	29.40	127	34x4	..
Moline-Knight, C	1650	4	22.50	118	34x4	36
Monitor	1195	6	25.35	117	33x4	36
Monroe, M-6	995	4	16.90	115	32x4	36
Moon, 6-36	1195	6	19.84	114	32x3½	36
Moore, 30	695	4	22.50	108	30x3½	61
Nash, 681, 683	1295	6	25.35	121	34x4	37
Oakland, 34B	990	6	18.99	112	32x4	37
Oldsmobile, 37	1185	6	19.00	112	32x4	..
Olympian	965	4	16.90	114	32x3½	..
Overland, 90	795	4	18.23	106	31x4	37
Overland, 85-4	930	4	27.23	112	32x4	37
Overland, 85-6	1130	6	25.35	116	32x4	..
Packard, 3-25, Phaeton	3700	12	43.20	128	35x5	37
Packard, 3-25, Salon Phaeton	3700	12	43.20	128	35x5	..
Paige, 6-39	1330	6	23.44	117	32x4	37
Pan-American, G-5	1500	6	23.44	120	33x4½	61
Paterson, 6-45	1265	6	25.35	120	32x4	37
Pennsy, 18	1035	4	22.50	115	32x3½	..
Pennsy, 6-18	1335	6	25.35	120	33x4	..
Pierce-Arrow, 38-C-4	4800	6	38.40	134	34x4½	37
Pierce-Arrow, 66-A-4	6400	6	60.00	147½	36x5½	..
Pierce-Arrow, 48-B-4	5400	6	48.60	142	35x5	..
Pilot, 6-45	1295	6	23.44	119	32x4	..
Princess, 4-36	875	4	22.50	108	32x3½	..
Roamer, O-4-75	....	4	.....	128	33x5	37
Regal, J	795	4	19.60	108	30x3½	37
Reo, R	985	4	27.23	115	34x4	37
Saxon, S-4	935	6	19.84	112	32x3½	37
Sayers, 6	1495	6	25.35	118	32x4	67

Five-Passenger Touring Continued

NAME AND MODEL	PRICE	CYL.	HP.	W.B.	TIRES	ILL. ON PAGE
Scripps-Booth, 6-39	....	6	19.00	112	....	67
Seneca, O	850	4	15.63	108	30x3½	..
Shad-Wyck, A and B	2650	6	29.40	128	33x4½	..
States, C-18	995	6	21.60	110	30x3½	..
Stearns, SKL-4	1785	4	22.50	119	34x4	37
Stephens, 6, 75	1485	6	25.35	118	32x4	37
Studebaker, 6	1295	6	29.40	119	32x4	61
Studebaker, 4	895	4	19.60	112	32x3½	61
Templar, 445	1985	4	18.23	118	32x4	..
Velie, 38	1340	6	25.35	115	32x4	37
Westcott, 18	1940	6	29.40	125	35x4½	..
Westcott, S-18	1790	6	29.40	125	35x4½	..
Winton Six, 33	2950	6	33.75	128	36x4½	37
Winton Six, 48	3500	6	48.60	138	37x5	..

Four-Passenger Touring Cars

NAME AND MODEL	PRICE	CYL.	HP.	W.B.	TIRES	ILL. ON PAGE
Abbott, 6-62	....	6	29.40	122	34x4	..
Apperson, 8-18	$2550	8	33.80	...	35x5½	..
Biddle, H	2650	4	22.50	121	32x4	43
Cadillac, 57, Phaeton	2805	8	31.25	125	35x5	43
Cole 8, 872 Tourster	2395	8	39.20	127	35x4½	61
Columbia, 6, Sport	1450	6	25.35	115	32x4	43
Cunningham	4450	8	45.00	132	37x5	..
Cunningham	4250	8	45.00	132	37x5	..
Daniels, B	3100	8	33.80	127	34x4½	..
Dorris, I-C-6	2785	6	38.40	130	36x4½	43
Elgin, F	1095	6	23.44	117	32x4	..
Empire, 73	1360	6	25.35	120	34x4	61
HAL Twelve, 25, Touring roadster	3750	12	39.68	135	....	..
Hudson Super-Six, Phaeton	2050	6	29.40	125½	32x4½	..
Jackson, Wolverine Flyer	1575	8	28.80	118	37x4	43
Jordan, Sport Marine	2375	6	29.40	127	32x4	61
Jordan, 60	1995	6	29.40	127	32x4	..
King, 8, Foursome	....	8	28.80	120	34x4	43
Lexington, R, Sport Tour	1585	6	25.35	122	34x4	61
Locomobile, 48	6050	6	48.60	142	37x5	..
Locomobile, 38	5150	6	43.35	139	36½x4½	..
Maibohm, B, Phaeton	975	6	23.44	115	32x3½	61
Mercer, Sporting	3500	4	22.50	132	32x4½	43
Moore, 30	695	4	22.50	108	30x3½	..
Murray	2800	8	33.80	128	34x4½	43
National, 6, Sport Phaeton	1995	6	29.40	128	34x4½	43
National, 12, Sport Phaeton	2595	12	39.68	128	34x4½	..
Nelson	1400	4	15.63	104	32x4	..
Oldsmobile, 45-A, Sportster	1550	8	26.45	120	34x4	..
Packard, 3-25, Runabout	3700	12	43.20	128	35x5	43
Princess, 4-36E	875	4	22.50	108	32x3½	..
Roamer, 6-54	2095	6	....	128	34x4	..
Roamer, 6-45	1950	6	....	128	34x4	..
Scripps-Booth, H	1595	8	22.05	120	32x4	..
Shad-Wyck	2650	6	29.40	128	33x4½	..
Singer, Sport Touring	4000	6	38.40	139	35x5	..
Stephens, Sport	1550	6	25.35	118	32x4	43
Templar, 445	1985	4	18.23	118	32x4	43
Templar, 445, Victoria	2155	4	18.23	118	32x4	..
Wolverine	3750	4	30.63	125	32x4½	..
Willys Six, Club	1365	6	29.40	120	33x4½	43
Winton Six, 48	3500	6	48.60	138	37x5	..
Winton Six, 33	2950	6	33.75	128	36x4½	..

Four-Passenger Roadsters

NAME AND MODEL	PRICE	CYL.	HP.	W.B.	TIRES	ILL. ON PAGE
American Six, B, Cloverleaf	$1465	6	23.44	122	32x4	..
Apperson, 8-18-4, Chummy	2550	8	33.80	130	35x4½	41
Apperson, 6-17-4	2200	6	29.40	130	35x4½	..
Auburn, 6-39, Chummy	1345	6	25.35	120	35x4½	..
Auburn, 6-39, Sport	1385	6	25.35	120	35x4½	41
Auburn, 6-44, Chummy	1635	6	29.40	131	35x4½	..
Austin	3750	12	39.68	142	34x4½	..
Bell, Club	995	4	25.60	114	32x3½	..
Bell, Special	1145	4	25.60	114	32x3½	..
Biddle, H	2600	4	22.50	121	32x4	..
Dixie Flyer	995	4	16.90	112	32x3½	..
Bour-Davis, 18-A, Sport	1385	4	22.50	118	32x4	..
Briscoe, 4-24, Chummy	725	4	15.20	104	30x3½	41
Case, 6, Sport	1875	6	29.40	125	35x4½	41
Chalmers, 6-30, Duplex	1485	6	25.35	117	34x4	41
Chandler	1595	6	29.40	123	34x4	41
Chevrolet, 8	1385	8	36.45	120	34x4	..
Cole	1995	8	39.20	127	35x4½	..
Cole, 870	2395	8	39.20	127	35x4½	..
Cole, 871, Sportster	2395	8	39.20	127	35x4½	61
Commonwealth, 4-40	995	4	19.60	112	32x3½	41
Crawford	2250	6	29.40	122½	32x4	..
Crow-Elkhart, CE 36, DeLuxe	995	4	19.60	114	32x3½	..
Daniels, 8, Sportif	3100	8	33.80	127	34x4½	41
Dispatch, Cloverleaf	1250	4	22.50	120	36x3½	..
Elcar, 4	1095	4	19.60	116	32x3½	..
Elcar, E-6	1295	6	25.35	116	33x4	41
Empire	1360	6	25.35	120	34x4	..
Franklin, 9	2050	6	25.35	115	32x4	41
Ghent, 6-60	....	6	29.40	125	34x4	..
Glide, 6-40, Club	1395	6	23.44	119	34x4	41
Harvard	985	4	14.40	100	28x3	..

Four-Passenger Roadsters Continued

NAME AND MODEL	PRICE	CYL.	HP.	W.B.	TIRES	ILL. ON PAGE
Haynes, 39	1825	6	29.40	127	35x4½	..
Haynes, 44	2785	12	36.30	127	34x4½	41
Inter-State	1025	4	19.60	110	33x4	41
Jackson Wolverine, Cruiser	1495	8	28.80	118	37x4	..
Jordan, J-60	1995	6	29.40	127	35x4½	..
KisselKar, Double-Six	2250	12	39.60	...	34x4½	..
KisselKar, 100-Point	1385	6	25.35	117	34x4	..
Kline Kar, 6-38	1495	6	25.35	120	34x4	41
Lexington, O, Clubster	1385	6	25.35	117	34x4	42
Liberty Six, 10-B	1350	6	25.35	115	32x4	..
Marmon, 34	3550	6	33.75	136	32x4½	42
Marion-Handley, B 6-60	1850	6	29.40	125	35x4½	..
McFarlan, Destroyer	3750	6	48.60	136	35x5	..
McFarlan, 124	3500	6	48.60	136	35x5	..
Moline-Knight, C	1650	4	22.50	118	34x4	..
Moline-Knight, G	1985	4	25.60	122	35x4½	..
Monitor	1195	6	25.35	117	33x4	..
Moon, 6-66	1850	6	29.40	125	35x4½	..
Moon, 6-36	1095	6	19.84	114	32x3½	..
Moon, 6-45	1575	6	25.35	125	34x4	..
Moore, 30	695	4	22.50	108	30x3½	..
Murray	2800	8	33.80	128	34x4½	..
Nash, 6	1295	6	25.35	121	34x4	42
National Highway, 6	1995	6	29.40	128	34x4½	..
National Highway, 12	2595	12	39.68	128	34x4½	42
Oldsmobile, 45-A, Speedster	1550	8	26.45	120	34x4	42
Oldsmobile, 45-A	1467	8	26.45	120	34x4	..
Olympian	965	4	16.90	114	32x3½	..
Overland Country Club	840	4	18.23	104	31x4	42
Owen-Magnetic, O-36	3950	6	33.75	136	35x5	42
Packard, 3-25, Runabout	3700	12	43.20	128	35x5	..
Paige, 6-39, Cloverleaf	1330	6	23.44	117	32x4	..
Pan-American, H-4	1500	6	23.44	120	33x4½	..
Paterson, 6-45	1295	6	25.35	120	32x4	..
Peerless, 56	2340	8	33.80	125	35x4½	..
Pennsy, 18	1035	4	22.50	115	32x3½	..
Pennsy, 6-18	1335	6	25.35	120	33x4	..
Pierce-Arrow, 38-C-4	4800	6	38.40	134	34x4½	..
Pierce-Arrow, 66-A-4	6400	6	60.00	147½	36x5½	..
Pierce-Arrow, 48-B-4	5400	6	48.60	142	35x5	..
Pilot, 6-45	1295	6	23.44	119	32x4	..
Premier, Foursome	2285	6	27.34	125½	32x4½	42
Reo, M	1385	6	22.16	126	34x4½	..
Saxon, 6, Chummy	935	6	19.84	112	32x3½	42
Standard, 8-G	2450	8	33.80	127	34x4½	..
Stearns, SKL 4	1785	4	22.50	119	34x4	..
Stearns, SK 8	2575	8	33.80	125	35x4½	..
Stutz, S	2650	4	30.63	120	32x4½	..
Velie, 38	1340	6	25.35	115	32x4	..
Velie, 39, Sport	1850	6	29.40	124	33x4½	42
Westcott, 18	1890	6	29.40	125	35x4½	42
White, GMT, Runabout	5000	4	28.90	124½	35x5	42
Winton Six, 33, Cloverleaf	2950	6	33.75	128	36x4½	..
Winton Six, 48, Cloverleaf	3500	6	48.60	138	37x5	..
Yale Eight, M, Speedster	1650	8	28.80	126	34x4	..

Two-Passenger Roadsters

NAME AND MODEL	PRICE	CYL.	HP.	W.B.	TIRES	ILL. ON PAGE
Allen, 41	$1095	4	22.50	112	32x3½	..
American, 6, B	1465	6	23.44	122	32x4	38
Austin	3750	12	39.68	142	34x4½	38
Briscoe, 4-24, Runabout	....	4	15.20	104	30x3½	38
Buick, E-Four-34	795	4	18.23	106	31x4	38
Cadillac, 57	2805	8	31.25	125	35x5	38
Chalmers, 6-30	1485	6	25.35	117	34x4	38
Chevrolet, 490	620	4	21.76	102	30x3½	38
Chevrolet, FA	935	4	21.76	108	33x4	38
Crawford	2250	6	29.40	122½	32x4	..
Daniels, B	3100	8	33.80	127	34x4½	..
Disbrow	2950	4	41.02	116	33x4½	61
Dispatch	1150	4	22.50	120	36x3½	39
Dodge Brothers	885	4	24.03	114	32x3½	39
Empire, 51	1165	4	24.03	115	33x4	39
Ford, T, Runabout	345	4	22.50	100	30x3	39
Franklin, 9, Runabout	2000	6	25.35	115	32x4	39
Geronimo, 6 A 45	1260	6	23.44	122	32x4	..
Grant	1055	6	21.60	114	32x3½	39
HAL Twelve, 25	3600	12	39.68	135	....	..
Harvard	750	4	14.40	100	28x3	61
Homer-Laughlin, D	1050	8	16.26	112	30x3½	..
Hupmobile, R	1250	4	16.90	112	32x4	39
Inter-State, T R	950	4	19.60	110	33x4	67
Jackson Wolverine	1495	8	28.80	118	37x4	39
KlineKar, 6-38	1495	6	25.35	120	34x4	39
Liberty Six, 10-B	1350	6	25.35	115	32x4	39
Maibohm, A, Sport	795	4	15.63	105	30x3½	61
Maibohm, B	975	6	23.44	115	32x3½	..
Maxwell, 25	745	4	21.03	109	30x3½	39
McFarlan	3500	6	48.60	136	35x5	..
Mercer, Runabout	3400	4	22.50	115	32x4	39
Mercer Raceabout	3250	4	22.50	115	32x4	67
Metz, 25	695	4	24.03	108	32x3½	..
Mitchell, D-40	1250	6	25.35	120	32x4	..
Moore, 30	695	4	22.50	108	30x3½	..
Monitor	1195	6	25.35	117	33x4	..
Murray	....	8	33.80	128	34x4½	39
National, 6, Speedster	....	6	29.40	128	34x4½	..
National, 12, Speedster	....	12	39.68	128	34x4½	..

Two-Passenger Roadsters Continued

NAME AND MODEL	PRICE	CYL.	HP.	W.B.	TIRES	ILL. ON PAGE
Nelson	1200	4	15.63	104	32x4	..
Oakland, 6, 34-B	990	6	18.99	112	32x4	39
Oldsmobile, 45-A	1467	8	26.45	120	34x4	39
Oldsmobile, 37	1185	6	19.00	112	32x4	..
Overland, 90	780	4	18.23	104	31x4	40
Peerless, 56, Sport	2490	8	33.80	125	35x4½	..
Pierce-Arrow, 48-B-4	5400	6	48.60	142	35x5	..
Pierce-Arrow, 38-C-4	4800	6	38.40	134	34x4½	..
Pierce-Arrow, 66-A-4	6400	6	60.00	147½	36x5½	..
Saxon 4	445	4	18.10	96	30x3	40
Singer	4000	6	38.40	139	35x5	..
Standard, S-G	2450	8	33.80	127	34x4½	..
Stutz, S, Speedster	2550	4	30.63	120	32x4½	40
Stutz, S	2550	4	30.63	120	32x4½	40
Templar, 445	2255	4	18.23	118	32x4	67
Velie, 38	1340	6	25.35	115	32x4	40
Wolverine Speedway	3500	4	25.50	115	32x4½	40
Winton Six, 33	2950	6	33.75	128	36x4½	..
Winton Six, 48	3500	6	48.60	138	37x5	..
Yale, 8	1650	8	28.80	126	34x4	..

Odd-Capacity Roadsters

Biddle, H, 3-pass	$2650	4	22.50	121	32x4	..
Buick, E-Six-44, 3-pass.	1265	6	27.34	118	34x4	40
Chalmers, 6-30	1485	6	25.35	117	34x4	..
Davis, JI-18, 5-pass.	1785	6	29.40	125	34x4½	..
Davis, I-18, 5-pass.	1485	6	25.35	119	34x4	..
Dort, 11, 3-pass	....	4	19.60	105½	30x3½	..
Grant, G, 3-pass	1055	6	21.60	114	32x3½	..
Jones, 26 AB, 5-pass.	1675	6	29.40	125	34x4	40
King, 8, 3-pass	....	8	28.80	120	34x4	40
KisselKar, 100-Point, Six	1295	6	25.35	117	34x4	40
KlineKar, 6-38, 3-pass.	1495	6	25.35	120	34x4	..
Maxwell, 25, 3-pass.	745	4	21.03	109	30x3½	..
Mitchell, D-40, Club, 5-pass.	1280	6	25.35	120	32x4	..
Mitchell, C-42, 3-pass.	1490	6	29.40	127	34x4	..
Mitchell, C-42, Club, 5-pass.	1560	6	29.40	127	34x4	40
Monroe, M-6, Club, 3-pass.	995	4	16.90	115	32x4	..
Oakland, 34-B, 3-pass.	990	6	18.90	112	32x4	..
Overland, 85-4, 3-pass.	915	4	27.23	112	32x4	..
Overland, 85-6, 3-pass.	1115	6	25.35	116	32x4	..
Paige, 6-39, 3-pass.	1330	6	23.44	117	32x4	..
Pierce-Arrow, 38-C-4, 3-pass.	4899	6	38.40	134	34x4½	40
Pierce-Arrow, 66-A-4, 3-pass.	6400	6	60.00	147½	36x5½	..
Pierce-Arrow, 48-B-4, 3-pass.	5400	6	48.60	142	35x5	..
Princess, 3-pass	875	4	22.50	108	32x3½	..
Reo, R, 3-pass	985	4	27.23	115	34x4	40
Scripps-Booth, G, 3-pass.	935	4	21.76	110	30x3½	..
States, C-18, 3-pass.	995	6	21.60	110	30x3½	..
Stephens, 6-70, 3-pass.	1485	6	25.35	118	32x4	40
Winton Six, 33, 3-pass.	2959	6	33.75	128	36x4½	..
Winton Six, 33, 3-pass., Cloverleaf	2950	6	33.75	128	36x4½	..

Convertible Coupes

Anderson, 20	....	6	25.35	120	33x4	..
Crow-Elkhart, CE 36	$1195	4	19.60	114	32x3½	52
Dodge Brothers	1050	4	24.03	114	32x3½	..
KisselKar, Double-Six Sedané	2800	12	39.68	...	34x4½	..
KisselKar, 100-Point Six	1885	6	25.35	117	34x4	..
Lexington, O	1545	6	25.35	116	32x4	52
Maibohm, A	1095	4	15.63	105	30x3½	..
Maibohm, B	1375	6	23.44	115	32x3½	..
McFarlan, 134	5250	6	48.60	136	35x5	..
Oakland, 34-B	1150	6	18.99	112	32x4	..
Pilot, 6-45	1520	6	23.44	119	32x4	52
Westcott, 18	2790	6	29.40	125	35x4½	..

Convertible Sedans

Auburn, 6-39	$1595	6	25.35	120	34x4	..
Auburn, 6-44	1985	6	29.40	131	35x4½	52
Crow-Elkhart, CE 36	1275	4	19.60	114	32x3½	52
Dodge Brothers, Winter Car	1050	4	24.03	114	32x3½	52
Glide, 6-40	1795	6	23.44	119	34x4	..
Grant, G	1350	6	21.60	114	32x3½	..
KisselKar, Double-Six, Sedané	2650	12	39.68	...	34x4½	52
Kisselkar, 100-Point Six	1885	6	25.35	117	34x4	52
Liberty, 10-B	1625	6	25.35	115	32x4	..
Mitchell, D-40	1550	6	25.35	120	32x4	52
Pilot, 6-45	1945	6	23.44	119	32x4	52
Stearns, SKL 4	2535	4	22.50	119	34x4	..
Westcott, 18	2790	6	29.40	125	35x4½	..
Winton Six, 33	4000	6	33.75	128	36x4½	..

Open Sedans

NAME AND MODEL	PRICE	CYL.	HP.	W.B.	TIRES	ILL. ON PAGE
Case, All Season	$2375	6	29.40	125	35x4½	50
Chalmers, 6-30, Tour.	1950	6	25.35	117	34x4	50
Chevrolet, 490	1060	4	21.76	102	30x3½	50
Chevrolet, FA	1475	4	21.76	108	33x4	..
Cole 8, Tour. sedan	....	8	39.20	127	35x4½	50
Columbia, 6, Tour. Sedan	....	6	25.35	115	32x4	50
Davis, 6K-18	1850	6	25.35	119	34x4	50
Dodge Brothers	1350	4	24.03	114	32x3½	50
Dort II, Sedanet	845	4	19.60	105½	30x3½	..
Elgin, A	1645	6	23.44	117	32x4	..
Grant, G	1595	6	21.60	114	32x3½	67
HAL Twelve, 25	4500	12	39.68	135	.....	..
Haynes, 39	2585	6	29.40	127	35x4½	60
Haynes, 44	3385	12	36.30	127	34x4½	..
Hudson Super-Six	2750	6	29.40	125½	32x4½	..
Jackson Wolverine	2195	8	28.80	118	37x4	50
Jordan, 60	2750	6	29.40	127	35x4½	50
King, EE	....	8	28.80	120	34x4	..
KlineKar, 6-38	2195	6	25.35	120	34x4	..
Maibohm, B	1375	6	23.44	115	32x3½	..
Marion-Handley, 6	....	..	....	....	.....	51
Maxwell, 25	1095	4	21.03	109	30x3½	..
Mitchell, D-40, Tour. Sedan	1950	6	25.35	120	32x4	51
Mitchell, C-42, Tour. Sedan	2275	6	29.40	127	34x4	..
Mitchell, C-42, Club Sedan	2185	6	29.40	127	34x4	..
Moon, 6-66	2650	6	29.40	125	35x4½	51
Murray	4000	8	33.80	128	34x4½	..
Nash, 6	1985	6	25.35	127	34x4	51
National, 6, Tour. Sedan	2820	6	29.40	128	34x4½	..
National, 12, Tour. Sedan	3420	12	39.68	128	34x4½	..
Oakland, 34B, Tour. Sedan	1190	6	18.99	112	32x4	..
Oldsmobile, 37, All Season	1695	6	19.00	112	32x4	51
Olympian	1565	4	16.90	114	32x3½	..
Overland, 90, Tour. Sedan	1240	4	18.23	106	31x4	..
Overland, 85-6, Tour. Sedan	1620	6	25.35	116	32x4	51
Paige, 6-39	1925	6	23.44	117	32x4	..
Paige, 6-55	2850	6	29.40	127	35x4½	51
Peerless, 56	2990	8	33.80	125	35x4½	..
Premier	3285	6	27.34	125½	32x4½	60
Reo, M	1950	6	22.16	126	34x4½	51
Standard, 8-G, Tour.	3500	8	33.80	127	34x4½	..
Stephens, 6, Tour.	1985	6	25.35	118	32x4	..
Velie, 38	1885	6	25.35	115	32x4	51
Westcott, 18	2790	6	29.40	125	35x4½	51
Willys Six, Tour. Sedan	2045	6	29.40	120	33x4½	..
Willys-Knight, 88-S, Tour. Sedan	2700	8	36.45	125	34x4½	..

Landaulets

Brewster	$8650	4	25.60	125	34x4½	..
Cadillac, 57	4310	8	31.25	125	35x5	..
Cadillac, 57	4295	8	31.25	125	35x5	55
Chalmers, 6-30	3025	6	25.35	117	34x4	..
Chalmers, 6-30, town car landaulet	3025	6	25.35	117	34x4	55
Ford, T, town car	595	4	22.50	100	30x3	55
Hudson, Super-Six	3500	6	29.40	125½	32x4½	..
Hudson, Super-Six	4252	6	29.40	125½	32x4½	..
Liberty, 6, 10-B	2700	6	25.35	115	32x4	..
Locomobile, 48	7300	6	48.60	142	37x5	..
Locomobile, 38	6300	6	43.35	139	36½x4½	..
Marmon, 34	5350	6	33.75	136	32x4½	..
Owen, O-36	5200	6	33.75	136	35x5	55
Packard, 3-25	5300	12	43.20	128	35x5	..
Packard, 3-35	5700	12	43.20	136	35x5	55
Pennsy, 6-18	1850	6	25.35	120	33x4	..
Phianna	....	4	24.70	...	32x4½	..
Pierce-Arrow, 48-B-4	6800	6	48.60	142	35x5	55
Pierce-Arrow, 38-C-4	5900	6	38.40	134	34x4½	..
Singer	4850	6	38.40	139	35x5	..
Stearns, SKS	3985	8	33.80	125	35x4½	..
Stearns, SKL4	3300	4	22.50	119	34x4	..
White, GM	6200	4	28.90	137½	35x5	..
White, GMT, town car landaulet	6050	4	28.90	124½	35x5	..
Winton Six, 33	4200	6	33.75	128	36x4½	..
Winton Six, 48	4750	6	48.60	138	37x5	..

Berlines

Brewster, Inclosed Drive	$7900	4	25.60	125	34x4½	..
Cadillac, 57, Imperial	4345	8	31.25	125	35x5	59
Cunningham, Inside Drive	6000	8	45.00	132	37x5	59
Hudson, Super-Six touring limousine	3150	6	29.40	125½	32x4½	..
Jordan, 60, Sedan	2650	6	29.40	127	35x4½	59
Locomobile, 38	6400	6	43.35	139	36½x4½	..
Locomobile, 48	7400	6	48.60	142	37x5	..
Maxwell, 25	1095	4	21.03	109	30x3½	59
McFarlan	4900	6	48.60	136	35x5	..
Packard, 3-35, Imperial Limousine	5850	12	43.20	136	35x5	..
Packard, 3-25, Imperial Limousine	5450	12	43.20	128	35x5	..
Pierce-Arrow, 66-A-4, Vestibule Suburban	8000	6	60.00	147½	36x5½	59

Berlines Continued

NAME AND MODEL	PRICE	CYL.	HP.	W.B.	TIRES	ILL. ON PAGE
Simplex-Crane	10200	6	45.94	143½	Opt.	59
Winton Six, 33, Full Four-Door Limousine	4200	6	33.75	128	36x4½	..
Winton Six, 48, Full Four-Door Limousine	4750	6	48.60	138	37x5	59

Sedans

Anderson, 20	....	6	25.35	120	33x4	..
Apperson	$3400	8	33.80	130	38x4	..
Auburn, 6-44	2450	6	29.40	131	35x4½	..
Austin	4950	12	39.68	142	34x4½	..
Biddle, H	4100	4	22.50	121	32x4	..
Briscoe, 4-24, Coachaire	850	4	15.20	104	30x3½	48
Buick, E-Six-50	2175	6	27.34	124	34x4½	48
Cadillac, 57, Brougham	3650	8	31.25	125	35x5	48
Chandler, 25	2295	6	29.40	123	34x4	..
Comet	2150	6	29.40	125	33x4	..
Chevrolet, FA	1475	4	21.76	108	33x4	48
Crawford, 18-6-40	2750	6	29.40	122½	32x4	..
Daniels, B, Suburban Berlin	....	8	33.80	127	34x4½	48
Davis, K-18	1850	6	25.35	119	34x4	..
Deering Magnetic	4500	6	38.40	132	33x5	..
Dispatch, G	1500	4	22.50	120	36x3½	..
Dorris, I-C-6	3350	6	38.40	130	36x4½	..
Dort, II	1095	4	19.60	105½	30x3½	..
Elcar, 4	1625	4	19.60	116	32x3½	..
Elcar, 6	1795	6	25.35	116	33x4	..
Empire, 70 S	1685	6	25.35	120	34x4	48
Ford, T	695	4	22.50	100	30x3	49
Franklin, 9	2950	6	25.35	115	32x4	49
Ghent, 6-60	....	6	29.40	125	34x4	..
Hackett	....	4	22.50	112	32x3½	67
Inter-State, T	1325	4	19.60	110	33x4	..
Jones, 26, A. B	2550	6	29.40	125	34x4	..
Jordan, 60, Sport Limousine	3500	6	29.40	127	35x4½	..
Liberty, 6, 10-B	1925	6	25.35	115	32x4	..
Marmon, 34	4950	6	33.75	136	32x4½	49
Maxwell, 25	1095	4	21.03	109	30x3½	49
McFarlan	4600	6	48.60	136	35x5	..
Moline-Knight, L	2280	4	22.50	118	34x4	..
Monroe, M-6	1850	4	16.90	115	32x4	..
Moon, 6-66	2650	6	29.40	125	35x4½	..
Nelson	1800	4	15.63	104	32x4	60
Owen-Magnetic, W-42	6300	6	38.40	142	35x5	..
Packard, 3-25, Brougham	5300	12	43.20	128	35x5	..
Packard, 3-25, Brougham	5400	12	43.20	128	35x5	..
Packard, 3-35, Brougham	5800	12	43.20	136	35x5	49
Paterson, 6-45	1795	6	25.35	120	32x4	60
Pennsy, 6-18	2250	6	25.35	120	33x4	..
Pierce-Arrow, 38-C-4	5900	6	38.40	134	34x4½	..
Roamer, 6-54	3250	6	....	128	34x4	..
Roamer, 6-45	3150	6	....	128	34x4	..
Saxon, S-4	1395	6	19.84	112	32x3½	49
Templar, 445	....	4	18.23	118	32x4	..
White, GMT	6050	4	28.90	124½	35x5	49
Winton Six, 33	4200	6	33.75	128	36x4½	49
Winton Six, 48	4750	6	48.60	138	37x5	..
Yale, S	2750	8	28.80	126	34x4	..

Coupes and Cabriolets

Abbott, 6-62	....	6	29.40	122	34x4	..
Buick, E-Six-46	$1695	6	27.34	118	34x4	53
Cadillac, 57	3205	8	31.25	125	35x5	..
Chalmers, 6-30, Cabriolet	1775	6	25.35	117	34x4	53
Chandler	2195	6	29.40	123	34x4	53
Chevrolet, 490	1060	4	21.76	102	30x3½	53
Cunningham, Cabriolet	6000	8	45.00	132	37x5	..
Deering-Magnetic	4350	6	38.40	132	33x5	..
Dispatch	1400	4	22.50	120	36x3½	..
Dodge Brothers	1350	4	24.03	114	32x3½	53
Dorris, I-C-6	3325	6	38.40	130	36x4½	..
Ford, T	560	4	22.50	100	30x3	53
Franklin, 9, Cabriolet	2850	6	25.35	115	32x4	..
Franklin, 9, Brougham	2900	6	25.35	115	32x4	53
Grant, G	1575	6	21.60	114	32x3½	..
Haynes, 39	2535	6	29.40	127	35x4½	..
Haynes, 44	3335	12	36.30	127	34x4½	..
Jordan, 60, Brougham	3000	6	29.40	127	35x4½	53
Maibohm, A	1095	4	15.63	105	30x3½	..
Maibohm, B, Cabriolet	1375	6	23.44	115	32x3½	..
Maxwell, 25	1095	4	21.03	109	30x3½	53
Mitchell, D-40	1850	6	25.35	120	32x4	53
Mitchell, C-42, Cabriolet	1960	6	29.40	127	34x4	..
Mitchell, C-42	2135	6	29.40	127	34x4	..
Moon, 6-66	2550	6	29.40	125	35x4½	53
Moon, 6-66, Cabriolet	2550	6	29.40	125	35x4½	..
Moon, 6-45, Cabriolet	2350	6	25.35	125	34x4	..
Murray	3600	8	33.80	128	34x4½	..
National, 6	2645	6	29.40	128	34x4½	53
National, 12	3245	12	39.68	128	34x4½	54
Oakland, 34-B	1490	6	18.99	112	32x4	..
Oldsmobile, 37	1595	6	19.00	112	32x4	54
Olympian, Cabriolet	1340	4	16.90	114	32x3½	54
Overland, 85-6	1420	6	25.35	116	32x4	..

Coupes and Cabriolets Continued

NAME AND MODEL	PRICE	CYL.	HP.	W.B.	TIRES	ILL. ON PAGE
Overland, 85-4	1285	4	27.23	112	32x4	..
Packard, 3-25	5050	12	43.20	128	35x5	54
Paige, 6-55	2850	6	29.40	127	35x4½	54
Peerless, 56	2850	8	33.80	125	35x4½	60
Pierce-Arrow, 38-C-4	5700	6	38.40	134	34x4½	..
Pierce-Arrow, 66-A-4	7400	6	60.00	147½	36x5½	..
Pierce-Arrow, 48-B-4	6400	6	48.60	142	35x5	..
Standard, 8-G	3500	8	33.80	127	34x4½	..
Stearns, SKL 4	2400	4	22.50	119	34x4	..
Stearns, SK 8	3200	8	33.80	125	35x4½	54
Stutz, S	3250	4	30.63	120	32x4½	..
Velie, 38	1900	6	25.35	115	32x4	54
Velie, 38, Cabriolet	1850	6	25.35	115	32x4	..
White	6050	4	28.90	124½	35x5	54
White, GM, Cabriolet	6400	4	28.90	137½	35x5	..
Willys-Knight, 88-4	2175	4	27.23	121	34x4½	54
Winton Six, 33	3950	6	33.75	128	36x4½	54
Winton Six, 33, Coupelet	3265	6	33.75	128	36x4½	..
Winton Six, 48	4500	6	48.60	138	37x5	..
Winton Six, 48, Coupelet	3750	6	48.60	138	37x5	..
Woods Dual Power	2950	4	12.10	124	35x4½	54

Limousines

Austin	$5250	12	39.68	142	34x4½	56
Brewster	8500	4	25.60	125	34x4½	..
Cadillac, 57	4145	8	31.25	125	35x5	56
Chalmers, 6-30	2925	6	25.35	117	34x4	56
Chandler	2895	6	29.40	123	34x4	56
Dorris, I-C-6	4150	6	38.40	130	36x4½	..
Fiat, 55	6500	4	44.10	140	35x5	..
Franklin, 9	3200	6	25.35	115	32x4	..
HAL Twelve, 25	5000	12	39.68	135	.....	..
Hudson Super-Six	3400	6	29.40	125½	32x4½	56
Locomobile, 48	7200	6	48.60	142	37x5	56
Locomobile, 38	6200	6	43.35	139	36½x4½	..
Marmon, 34	5250	6	33.75	136	32x4½	56
McFarlan	4650	6	48.60	136	35x5	56
Mitchell, C-42	2850	6	29.40	127	34x4	57
Murray	4000	8	33.80	128	34x4½	..
Owen-Magnetic, W-42	6300	6	38.40	142	35x5	..
Packard, 3-25	5250	12	43.20	128	35x5	..
Packard, 3-35	5650	12	43.20	136	35x5	57
Paige, 6-55	3230	6	29.40	127	35x4½	57
Peerless, 56	3690	8	33.80	125	35x4½	60
Phianna	....	4	24.70	...	32x4½	..
Pierce-Arrow, 48-B-4, Suburban	6800	6	48.60	142	35x5	57
Pierce-Arrow, 38-C-4	5900	6	38.40	134	34x4½	..
Premier, 6C	3285	6	27.34	125½	32x4½	..
Singer	4750	6	38.40	139	35x5	..
Standard, 8-G	4000	8	33.80	127	34x4½	57
Stearns, SKL 4	3350	4	22.50	119	34x4	..
Stearns, SK 8	3985	8	33.80	125	35x4½	..
White, GM	6200	4	28.90	131½	35x5	57
Willys-Knight, 88-4	2325	4	27.23	121	34x4½	..
Willys-Knight, 88-8	2800	8	36.45	125	34x4½	57
Winton Six, 48	4500	6	48.60	138	37x5	57
Winton Six, 33	3950	6	33.75	128	36x4½	..

Broughams and Town Cars

Biddle, H, Town Car	$4000	4	22.50	121	32x4	60
Biddle, H	3900	4	22.50	121	32x4	..
Brewster	8300	4	25.60	125	34x4½	..
Cadillac, 57, Town Limousine	4160	8	31.25	125	35x5	..
Chalmers, 6-30, Town Car	2925	6	25.35	117	34x4	58
Cunningham	6000	8	45.00	132	37x5	58
Fiat, E-17	6500	4	44.10	140	35x5	..
Fiat, 55	6500	4	44.10	140	55x5	58
Franklin, 9, Town Car	3200	6	25.35	115	32x4	58
HAL Twelve, 21-A	4500	12	39.68	135	34x4½	..
HAL Twelve, 25	5000	12	39.68	135	.....	..
Haynes, 44, Town Car	3985	12	36.30	127	34x4½	..
Haynes, 39, Town Car	3250	6	29.40	127	35x4½	60
Hudson Super-Six, Town Car	3400	6	29.40	125½	32x4½	58
Jordan, 60, Town Car	3300	6	29.40	127	35x4½	58
Liberty Six, 10-B	2700	6	25.35	115	32x4	58
Marmon, 34	5250	6	33.75	136	32x4½	..
McFarlan, Town Car	4600	6	48.60	136	35x5	58
Mitchell, C-42, Tourer	2850	6	29.40	127	34x4	58
Paige, 6-55, Town Car	3230	6	29.40	127	35x4½	58
Pierce-Arrow, 38-C-4	5900	6	38.40	134	34x4½	59
Pierce-Arrow, 66-A-4	7600	6	60.00	147½	36x5½	..
Pierce-Arrow, 48-B-4	6600	6	48.60	142	35x5	..
Singer	5350	6	38.40	139	35x5	..
Stearns, Town Car	3400	4	22.50	119	34x4	59
Stearns, SK8	3875	8	33.80	125	35x4½	..
Velie, 38	2450	6	25.35	115	32x4	..
White, GMT	6050	4	28.90	124½	35x5	..
Willys-Knight, 8	2800	8	36.45	125	34x4½	59
Winton Six, 33, French Limousine	3950	6	33.75	128	36x4½	59
Winton Six, 48, French Limousine	4500	6	48.60	138	37x5	..

Steamers

Doble-Detroit, 7-pass.	$3750	2	.....	135	35x5	67
Stanley, 5-pass	2400	2	.....	130	35x5½	..
Stanley, 7-pass	2500	2	.....	130	35x5½	..
Stanley, roadster	2400	2	.....	130	35x5½	..

1918 Passenger Automobiles Listed

MAKE AND MODEL	Wheel-base	No. of Cylinders	Bore and Stroke, Inches	Piston Displacement, Cubic Inches	Make of Engine	Cylinder Shape	Cam-shaft Drive	Water Circulation	LUBRICATION		CARBURETION		IGNITION			ELECTRIC SYS.		CLUTCH	
									System	Type of Pump	Make of Carbureter	Fuel Feed	System	Make	Control	Generator Make	Voltage	Make	Type
Abbott 6-62	122	6	3½x5¼	303	Continent	L.	Helical	Cent	Splash-Pres	Piston	Stromberg	Vacuum	Single	Remy	Hand	Remy	6	Muncie	Disk
Allen 41	112	4	3⅞x5	221	Own	L.	Helical	Ther	Circ-Spl	Piston	Stromberg	Vacuum	Single	Connecticut	Hand	Auto-Lite	6	Borg & Beck	Plate
American B	122	6	3¼x5	230	Rutenber	L.	Helical	Cent	Splash-Pres	Piston	Zenith	Vacuum	Single	G&D	Hand	G&D	6	Borg & Beck	Plate
Anderson 20	120	6	3¼x4½	224	Continent	L.	Helical	Cent	Splash-Pres	Piston	Zenith	Vacuum	Single	Connecticut	Hand	Westinghouse	6	Borg & Beck	Plate
Apperson	130	6	3½x5	288	Own	L.	Helical	Cent	Splash-Pres	Gear	Rayfield	Vacuum	Single	Remy	Hand	Bijur	6	Own	Plate
Apperson	130	8	3½x5	332	Own	L.	Helical	Ther	Splash-Pres	Gear	Johnson	Vacuum	Single	Remy	Hand	Bijur	6	Own	Plate
Arbenz 25	108	4	3½x5	166	Lycoming	L.	Helical	Ther	Splash	Piston	Carter	Gravity	Single	Dyneto	Hand	Dyneto	6		Cone
Auburn 6-39	120	6	3¼x4½	224	Teet-Hart	L.	Helical	Cent	Splash-Pres	Piston	Rayfield	Vacuum	Single	Remy	Hand	Remy	6	Borg & Beck	Plate
Auburn 6-44	131	6	3½x5¼	303	Continent	L.	Helical	Cent	Splash-Pres	Piston	Rayfield	Vacuum	Single	Remy	Hand	Remy	6	Borg & Beck	Plate
Austin	142	12	2¾x5	389	Weidely	I.	Helical	Cent	Pressure	Gear	Stromberg	Vacuum	Single	Delco	Hand	Delco	6	Muncie	Disk
Biddle H	121	4	3⅜x5¼	226	Buda	L.	Helical	Ther	Circ-Spl	Gear	Zenith	Vacuum	Single	Eisemann	Hand	G&D	6	Own	Plate
Bour-Davis 18A	118	4	3⅞x5	220	Continent	I.	Helical	Cent	Circ-Spl	Gear	Miller	Vacuum	Single	Westinghouse	Hand	Westinghouse	6	Borg & Beck	Plate
Bour-Davis 18B	118	6	3½x5¼	303	Continent	L.	Helical	Cent	Circ-Spl	Piston	Stromberg	Vacuum	Single	Westinghouse	Hand	Westinghouse	6	Borg & Beck	Plate
Brewster 1	125	4	4 x5½	276	Own	K	Chain	Cent	Pressure	Gear	Zenith	Vacuum	Single	Bosch	Hand	U-S-L	12	Own	Cone
Briscoe 4-24	104	4	3 7/16x5½	163	Own	L.	Helical	Ther	Circ-Spl	Piston	Dave-Buick	Gravity	Single	Connecticut	Hand	Auto-Lite	6	Own	Rev-C
Buick E-4-34	106	4	3⅜x4¾	170	Own	I.	Helical	Cent	Circ-Spl	Gear	Marvel	Vacuum	Single	Delco	H&A	Delco	6	Own	Cone
Buick E-4-35	106	4	3⅜x4½	170	Own	I.	Helical	Cent	Circ-Spl	Gear	Marvel	Vacuum	Single	Delco	H&A	Delco	6	Own	Cone
Buick E-6-44	118	6	3⅜x4½	242	Own	I.	Helical	Cent	Circ-Spl	Gear	Marvel	Vacuum	Single	Delco	H&A	Delco	6	Own	Disk
Buick E-6-45 & 46	118	6	3⅜x4½	242	Own	I.	Helical	Cent	Circ-Spl	Gear	Marvel	Vacuum	Single	Delco	H&A	Delco	6	Own	Disk
Buick E-6-49 & 50	124	6	3⅜x4½	242	Own	I.	Helical	Cent	Circ-Spl	Gear	Marvel	Vacuum	Single	Delco	H&A	Delco	6	Own	Disk
Cadillac 57	125 / 132	8	3½x5½	314	Own	L.	Chain	Cent	Pressure	Gear	Own	Pressure	Single	Delco	H&A	Delco	6	Own	Disk
Campbell	110	4	3¾x4	189	Own	L.	Sp-G	Ther	Circ-Spl	Gear	American	Vacuum	Single	At Kent	Hand	Auto-Lite	6	Muncie	Disk
Case U	125	6	3½x5¼	303	Continent	L.	Helical	Cent	Splash-Pres	Piston	Rayfield	Vacuum	Single	Westinghouse	Hand	Westinghouse	6	Borg & Beck	Plate
Chalmers	117 / 122	6	3¼x4½	224	Own	L.	Chain	Ther	Splash-Pres	Gear	Stromberg	Vacuum	Single	Remy	Hand	Westinghouse	6	Own	Disk
Chandler 25	123	6	3½x5	289	Own	L.	Chain	Cent	Splash-Pres	Piston	Rayfield	Vacuum	Single	Bosch	Hand	Westinghouse	6	Borg & Beck	Plate
Chevrolet 490	102	4	3 1/16x4	171	Own	I.	Helical	Cent	Splash-Pres	Gear	Zenith	Gravity	Single	Remy	Hand	Auto-Lite	6	Own	Cone
Chevrolet	108	4	3 1/16x5½	224	Own	I.	Helical	Cent	Splash-Pres	Gear	Zenith	Vacuum	Single	Remy	Hand	Auto-Lite	6	Own	Cone
Chevrolet D-4 & D-5	120	8	3⅜x4	286	Own	I.	Helical	Cent	Splash-Pres	Gear	Zenith	Vacuum	Single	Remy	Hand	Auto-Lite	6	Own	Cone
Cole 870	127	8	3¼x4½	346	Northway	L.	Helical	Gear	Pressure	Gear	Stromberg	Vacuum	Single	Delco	H&A	Delco	6	Northway	Cone
Columbia C&D	115	6	3¼x4½	224	Continent	L.	Helical	Cent	Splash-Pres	Piston	Stromberg	Vacuum	Single	At Kent	Hand	Rob-Myers	9	Borg & Beck	Plate
Comet C-50	125	6	3½x5	289	Lewis	L.	Helical	Cent	Splash-Pres	Piston	Miller	Vacuum	Single	Delco	H&A	Dyneto	6	Mechanics	Disk
Commonwealth 4-40	112	4	3½x5	192	Lycoming	L.	Helical	Ther	Circ-Spl	Piston	Carter	Vacuum	Single	At Kent	Hand	Dyneto	6	Mechanics	Disk
Crawford 6-40	122½	6	3½x5¼	303	Continent	L.	Helical	Cent	Circ-Spl	Piston	Stromberg	Vacuum	Double	Bosch	Hand	Westinghouse	6	Own	Plate
Crow-Elkhart CE-36	114	4	3½x5	192	Own	I.	Helical	Ther	Circ-Spl	Gear	Zenith	Vacuum	Single	Connecticut	Hand	Dyneto	6	Borg & Beck	Plate
Cunningham	132 / 142	8	3¾x5	442	Own	L.	Helical	Cent	Pressure	Gear	Stromberg	Vacuum	Single	Delco	H&A	Westinghouse	6		Disk
Daniels B	127	8	3¼x5	332	Hersh-Sp	L.	Helical	Cent	Pressure	Gear	Zenith	Vacuum	Single	Westinghouse	Hand	Westinghouse	6	Brown-Lipe	Disk
Davis H, I & K	119	6	3¼x4½	224	Continent	L.	Helical	Cent	Splash-Pres	Piston	Stromberg	Vacuum	Single	Delco	Hand	Delco	6	T.W.Warner	Cone
Davis J & JI	125	6	3½x5¼	303	Continent	L.	Helical	Cent	Splash-Pres	Piston	Stromberg	Vacuum	Single	Delco	H&A	Delco	6	T.W.Warner	Cone
Disbrow A	116	4	5 11/16x5½	446	Wisconsin	T.	Sp-G	Cent	Pressure	Gear	Miller	Pressure	Single	K-W	Hand	Leece-N	12	Warner	Disk
Dispatch G	120	4	3¾x5	221	Wisconsin	L.	Helical	Ther	Pressure	Gear	Rayfield	Vacuum	Single	Delco	Hand	U-S-L	12	Own	
Dodge	114	4	3⅝x4½	212	Own	L.	Helical	Cent	Circ-Spl	Gear	Stewart	Vacuum	Single	Delco	H&A	North-East	12	Own	Disk
Dorris I-C	130	6	4 x5	377	Own	I.	Helical	Cent	Pressure	Gear	Stromberg	Vacuum	Single	Bosch	Hand	Westinghouse	6	Brown-Lipe	Disk
Dort 11	105½	4	3½x5	192	Lycoming	L.	Helical	Ther	Circ-Spl	Piston	Carter	Gravity	Single	Connecticut	Hand	Westinghouse	6	Own	Cone
Elcar	116	4	3½x5	192	Lycoming	L.	Helical	Ther	Circ-Spl	Piston	Carter	Vacuum	Single	At Kent	Hand	Dyneto	6	Mechanics	Disk
Elcar	116	6	3¼x4½	224	Continent	L.	Helical	Cent	Splash-Pres	Piston	Stromberg	Vacuum	Single	At Kent	Hand	Dyneto	6	Borg & Beck	Plate
Elgin A	117	6	3⅛x4¼	196	Falls	I.	Helical	Ther	Circ-Spl	Piston	Stromberg	Vacuum	Single	Wagner	Hand	Wagner	6	Borg & Beck	Plate
Empire 50-51	115	4	3⅝x5	236	Teet-Hart	T.	Helical	Cent	Circ-Spl	Piston	Stromberg	Vacuum	Single	Connecticut	Hand	Auto-Lite	6	Borg & Beck	Plate
Empire 70-A	120	6	3¼x4½	224	Continent	L.	Helical	Cent	Splash-Pres	Piston	Stromberg	Vacuum	Single	Connecticut	Hand	Auto-Lite	6	Borg & Beck	Plate

ABBREVIATIONS

2-pt—*Two Point*
¾ Ell—¾ *Elliptic*
¾ *Float*—¾ *Floating*
¾ Plat—¾ *Platform*
Amid—*Amidships*
Atmtc—Automatic
B & P—*Ball and Plain*
B & R—*Ball and Roller*
B R & P—*Ball, Roller and Plain*
C & C—*Cup and Cone*
Cant—*Cantilever*
Cent—*Centrifugal*
Circ-Spl—*Circulating Splash*
Dual-D—*Dual Double*
Ell—*Elliptic*
F—*F-Head*
Float—*Floating*
Fric—*Friction*
Gear—*Gear Pump*
H—*Horizontal*
H & A—*Hand and Automatic*
I—*I-Head*
Imp—*Impeller*
K—*Knight type*
L—*L-Head*
Mag—*Magnetic*
Non-Spl—*Non-Circulating Splash*
Opt—*Optional*
Plan—*Planetary*
Plat—*Platform*
Rad-Rd—*Radius Rods*
Rev-C—*Reversed Cone*
Roll—*Roller*
S-A—*Semi-Automatic*
S-E—*Semi-Elliptic*
Semi-F—*Semi-Floating*
Sp-B—*Spiral Bevel*
Sp-G—*Spiral Gear*

with Their Technical Specifications

TRANSMISSION							RUNNING GEAR							BEARINGS			
GEARSET			Final Drive	Torque Taken By	Make of Rear Axle	Rear Axle Type	Gear Ratio on Direct	TIRES		Wheels	Rear Spr'gs	Make of Steering Gear	Make of Speed-ometer	Crank-shaft Bearings and Number	Gearset	Rear Axle	Front Wheel	MAKE AND MODEL
Make	Loca-tion	Forward Speeds						Front	Rear									
Muncie	Unit M	3	Sp.B	Springs	Salisbury	¾ Float	4.30–1	34x4	34x4	Wood†	S-E	Gemmer	Stewart	Plain 3	Ball	B&R	Roll	Abbott 6–62
Own	Unit M	3	Sp.B	Springs	Adams	Float	4.25–1	32x3½	32x3½	Wood	S-E	Ditwiler	Stewart	Plain 2	B&R	Ball	Roll	Allen 41
Mechanics	Unit M	3	Sp.B	Springs	Salisbury	¾ Float	4.42–1	32x4	32x4	Wood	S-E	Gemmer	Van Sicklen	Plain 3	B&P	B&R	Ball	American B
Durston	Unit M	3	Sp.B	Springs	Columbus	¾ Float	4.58–1	33x4	33x4	Wood†	S-E	C. A. S.	Stewart	Plain 3	Ball	Roll	Ball	Anderson 20
Own	Amid	3	Sp.B	Springs	Own	Semi-F	4.25–1	34x4	35x4½	Wood†	¾-Ell	Own	Van Sicklen	Plain 4	Roll	Roll	Plain	Apperson
Own	Amid	3	Sp.B	Springs	Own	Semi-F	4.25–1	34x4	35x4½	Wood†	¾-Ell	Own	Van Sicklen	Plain 3	Roll	Roll	Roll	Apperson
	Unit M	3	Bevel	Springs	Gemco	Float	4.25–1	30x3½	30x3½	Wood	Cant.		Carter	Plain 2	Ball	Roll	Ball	Arbenz 25
Grant-Lees	Unit M	3	Sp.B	Tor-A		¾ Float	4.42–1	34x4	34x4	Wood	S-E	Jacox	Stewart	Plain 3	Ball	Roll	Ball	Auburn 6–39
Grant-Lees	Unit M	3	Sp.B	Tor-A		Float	4.08–1	35x4½	35x4½	Wood	Cant.			Plain 3	Ball	Roll	Ball	Auburn 6–44
Muncie	Unit M	3	Sp.B	Springs	Own	Float	*3.75–1 *5.25–1	34x4½	34x4½	Wood†	Cant.	Lavine	Stewart	Plain 3	Ball	B&R	Roll	Austin
Own	Unit M	4	Sp.B	Springs	Own	Float	4.40–1	32x4	32x4	Wire	S-E	Gemmer	Warner	Plain 3	B&R	Roll	Roll	Biddle H
Detroit	Unit M	3	Sp.B	Springs	Salisbury	¾ Float	4.00–1	32x4	32x4	Wood	S-E	Gemmer	Van Sicklen	Plain 3	Ball	Roll	Ball	Bour-Davis 18A
Detroit	Unit M	3	Sp.B	Springs	Salisbury	¾ Float	4.07–1	33x4½	33x4½	Wood	S-E	Gemmer	Van Sicklen	Plain 3	Ball	Roll	Ball	Bour-Davis 18B
Own	Unit T	3	Sp.B	Tor-T	Own	Float	4.50–1	34x4½	34x4½	Wood	Cant.	Own	Stewart	Plain 3	Ball	Roll	Roll	Brewster 1
Own	Unit X	3	Bevel	Tor-A	Own	Semi-F	4.25–1	30x3½	30x3½	Wood†	Ell	Own	Stewart	Plain 2	BR&P	B&R	Ball	Briscoe 4–24
Own	Amid	3	Bevel	Springs	West-M	¾ Float	4.08–1	31x4	31x4	Wood	S-E	Jacox	Stewart	Plain 3	Ball	Roll	Ball	Buick E–4–34
Own	Amid	3	Bevel	Springs	West-M	¾ Float	4.08–1	31x4	31x4	Wood	S-E	Jacox	Stewart	Plain 3	Ball	Roll	Ball	Buick E–4–35
Own	Amid	3	Sp.B	Tor-T	West-M	Float	4.08–1	34x4	34x4	Wood	Cant.	Jacox	Stewart	Plain 4	Ball	Roll	Roll	Buick E–6–44
Own	Amid	3	Sp.B	Tor-T	West-M	Float	4.08–1	34x4	34x4	Wood	Cant.	Jacox	Stewart	Plain 4	Ball	Roll	Roll	Buick E–6–45 & 46
Own	Amid	3	Sp.B	Tor-T	West-M	Float	4.61–1	34x4½	34x4½	Wood	Cant.	Jacox	Stewart	Plain 4	Ball	Roll	Roll	Buick E–6–49 & 50
Own	Unit M	3	Sp.B	Tor-T	Timken	Float	4.43–1 5.07–1	35x5 34x4½	35x5 34x4½	Wood	Plat	Own		Plain 3	BR&P	Roll	Roll	Cadillac 57
Muncie	Unit M	3	Bevel	Springs	Salisbury	Float	4.25–1	30x3½	30x3½	Wood	S-E	Own	Van Sicklen	Plain 3	Ball	B&R	Ball	Campbell
Grant-Lees	Unit M	3	Sp.B	Springs	Columbia	¾ Float	4.45–1	35x4½	35x4½	Wood†	S-E	Jacox	Stewart	Plain 3	Ball		Roll	Case U
Own	Unit M	3	Sp.B	Springs	Timken	Semi-F	4.75–1 5.09–1	32x4 34x4	32x4 34x4	Wood	S-E	Own	Stewart	Plain 3	Roll	Roll	Roll	Chalmers
Own	Unit M	3	Sp.B	Tor-T	Own	Float	4.40–1	34x4	34x4	Wood	S-E	Gemmer C. A. S.	Stewart	Plain 3	Ball	Ball	Roll	Chandler 25
Own	Amid	3	Bevel	Springs	Own	¾ Float	3.65–1	30x3½	30x3½	Wood	Cant.	T.W.Warner	Stewart	Plain 3	B&P	Roll	C&C	Chevrolet 490
Own	Amid	3	Bevel	Springs	Own	¾ Float	4.25–1	33x4	33x4	Wood	Cant.	T.W.Warner	Stewart	Plain 3	B&P	Roll	C&C	Chevrolet
Own	Amid	3	Bevel	Tor-T	Own	¾ Float	4.25–1	34x4	34x4	Wood	Cant.	T.W.Warner	Stewart	Plain 3	B&P	Roll	C&C	Chevrolet D–4 & D–5
Northway	Unit M	3	Sp.B	Springs	Columbia	Float	4.45–1	35x4½	35x4½	Wood†	S-E	Warner	Warner	Plain 3	Ball	Roll	Roll	Cole 870
T.W.Warner	Unit M	3	Sp.B	Tor-T	Timken	¾ Float	4.75–1	32x4	32x4	Opt	Cant.	T.W.Warner	Stewart	Plain 3	Ball	Roll	Roll	Columbia C&D
Mechanics	Unit M	3	Sp.B	Tor-T	W-Weiss	¾ Float	4.50–1	33x4	33x4	Opt	Cant.	C. A. S.	Stewart	Plain 3	Ball	Roll	Ball	Comet C–50
Mechanics	Unit M	3	Sp.B	Springs	Peru	Float	4.00–1	32x3½	32x3½	Opt	¾ Ell	Ditwiler	Van Sicklen	Plain 2	Ball	B&R	Ball	Commonwealth 4–40
Own	Unit M	3	Sp.B	Springs	Timken	¾ Float	4.08–1	32x4	32x4	Wood	S-E	Gemmer	Stewart	Plain 3	Roll	Roll	Roll	Crawford 6–40
Own	Unit M	3	Bevel	Springs	Peru	Float	4.25–1	32x3½	32x3½	Opt	S-E	Jacox	Stewart	Plain 3	Ball	Roll	Roll	Crow-Elkhart CE–36
	Unit M	3	Sp.B	Tor-T	Timken	Float	3.08–1 4.08–1	35x5 37x5	35x5 37x5	Opt	¾ Ell	Gemmer	Warner	Plain 3	BR&P	Roll	Roll	Cunningham
Brown-Lipe	Unit M	3	Sp.B	Tor-T	Timken	¾ Float	4.45–1	34x4½	34x4½	Wood	S-E	Gemmer	Warner	Plain 3	B&R	Roll	Roll	Daniels B
T.W.Warner	Unit M	3	Sp.B	Springs	Columbia	¾Float	4.58–1	34x4	34x4	Wood	S-E	T.W.Warner	Stewart	Plain 3	B&P	Roll	Ball	Davis H, I & K
T.W.Warner	Unit M	3	Sp.B	Springs	Columbia	Float	4.42–1	34x4½	34x4½	Wood	S-E	T.W.Warner	Stewart	Plain 3	B&P	Roll	Roll	Davis J & JI
Warner	Unit M	3	Bevel	Springs	American	Float	2.91–1	33x4½	33x4½	Wire	S-E	Warner	Stewart	Plain 3	Roll	Roll	Roll	Disbrow A
Own	Amid	4	Chain	Springs	Own	Dead	4.12–1	36x3½	36x3½	Wood	Ell	Foster	Corb.-Brown	Plain	Ball	Ball	Ball	Dispatch G
Own	Unit M	3	Sp.B	Tor-T	Own	Float	4.17–1 3.62–1	32x3½	32x3½	Wood†	¾ Ell	Own	Johns-Man	Plain 3	R&P	Roll	Roll	Dodge
Own	Unit M	3	Sp.B	Tor-T	Timken	Float	3.50–1	36x4½	36x4½	Wood	Plat	Warner	Warner	Plain 7	Roll	Roll	Roll	Dorris I–C
Mechanics	Unit M	3	Bevel	Tor-T	W-Weiss	¾ Float	4.00–1	30x3½	30x3½	Opt	Cant.	Jacox	Stewart	Plain 2	B&P	R&P	Ball	Dort 11
Mechanics	Unit M	3	Sp.B	Springs	Salisbury	Float	4.50–1	32x3½	32x3½	Wood†	S-E	C. A. S.	Stewart	Plain 2	Ball	Roll	Roll	Elcar
Muncie	Unit M	3	Sp.B	Springs	Salisbury	Float	4.50–1	33x4	33x4	Wood†	S-E	C. A. S.	Stewart	Plain 3	Ball	Roll	Roll	Elcar
Mechanics	Unit M	3	Sp.B	Tor-A	Adams	¾ Float	4.45–1	32x4	32x4	Wood	Cant.	C. A. S.	Van Sicklen	Plain 3	B&P	Ball	Roll	Elgin A
Mechanics	Unit M	3	Bevel	Tor-T	Peru	¾ Float	4.33–1 3.75–1	33x4	33x4	Opt	S-E	C. A. S.	Stewart	Plain 3	B&P	B&R	Ball	Empire 50–51
Mechanics	Unit M	3	Sp.B	Springs	Hess	Float	4.58–1	34x4	34x4	Opt	S-E	C. A. S.	Stewart	Plain 3	B&P	B&R	Ball	Empire 70–A

Splash-Pres—*Splash Pressure*
Spur—*Spur Gears*
T—*T-Head*
Ther—*Thermo-Syphon*
Tor-A—*Torsion Arm*
Tor-R—*Torsion Rod*
Tor-T—*Torsion Tube*
Tr. S-E—*Transverse Semi-Elliptic*
Unit-M—*Unit with Motor*
Unit-T—*Unit with Torque Tube*
Unit-X—*Unit with Axle*
Vib-Dup—*Vibrating Duplex*
†—*Wire Extra*
*—*Two-Speed Axle*

EQUIPMENT

Allis-Ch—*Allis-Chalmers*
At Kent—*Atwater Kent*
A. W. T.—*American Watch Tool Co.*
Continent—*Continental*
Cut-Hammer—*Cutler-Hammer*
G.B.&S.—*Golden, Belknap & Swartz*
G. & D.—*Gray & Davis*
Gen. Elec.—*General Electric*
Hersh-Sp—*Herschell-Spillman*
Johns-Man—*Johns-Manville*
Leece-N—*Leece-Neville*
Longmare—*Longuemare*
Mass-Ph—*Massnick-Phipps*
Mer & Evans—*Merchant & Evans*
Reichbch—*Reichenbach*
Rob-Myers—*Robbins & Myers*
Shkspere—*Shakespeare*
Teet-Hart—*Teetor-Hartley*
U-S-L—*U. S. Light & Heating Corp.*
W-Weiss—*Walker-Weiss*
Ward-L—*Ward Leonard*
West-M—*Weston-Mott*

1918 Passenger Automobiles Listed with

MAKE AND MODEL	Wheel-base	No. of Cylinders	Bore and Stroke, Inches	Piston Displacement, Cubic Inches	Make of Engine	Cylinder Shape	Cam-shaft Drive	Water Circulation	LUBRICATION		CARBURETION		IGNITION			ELECTRIC SYS.		CLUTCH	
									System	Type of Pump	Make of Carbureter	Fuel Feed	Sys-tem	Make	Con-trol	Generator Make	Voltage	Make	Type
Empire.....71	120	6	3½x4½	224	Continent.	L.	Helical	Cent.	Splash-Pres.	Piston.	Stromberg.	Vacuum.	Single.	Connecticut.	Hand.	Auto-Lite....	6	Borg & Beck	Plate...
Empire.....73	120	6	3½x4½	224	Continent.	L.	Helical	Cent.	Splash-Pres.	Piston.	Stromberg.	Vacuum.	Single.	Connecticut.	Hand.	Auto-Lite....	6	Borg & Beck	Plate...
Fageol.....	140	6	5 x7	825	Hall-Scott.	I.	Bevel	Cent.	Pressure	Gear	Zenith	Vacuum.	Dual-D	Splitdorf	Hand.	Bosch	12	Hele-Shaw.	Disk...
Fergus.....	130	6	3½x4¾	236	Own	I.	Sp-B	Cent.	Pressure	Gear	Zenith	Vacuum.	Single.	Bosch	Hand.	Special	6	Own	Disk...
Fiat.....E-17	140	4	5½x6¾	584	Own	L.	Chain	Cent.	Splash-Pres.	Gear	Own	Pressure.	2-Pt.	Bosch	Hand.	Westinghouse	6	Own	Disk...
Ford.....T	100	4	3¾x4	177	Own	L.	Sp-G	Ther.	Splash-Grav.		Holley-Kng.	Gravity.	Single.	Own	Hand.			Own	Disk...
Franklin.....9	115	6	3½x4	199	Own	I.	Helical	Air	Pressure	Gear	Own	Vacuum.	Single.	At Kent	Atmtc	Dyneto	12	Own	Disk...
F.R.P.....45B	140	4	4⅜x6¾	445	Own	I.	Helical	Cent.	Splash-Pres.	Piston.	Stewart	Pressure.	2-Pt.	Bosch	Hand.	Bosch	12	Mer. & Ev.	Disk...
Geronimo.....	114	4	3½x5	192	Lycoming.	L.	Helical	Ther.	Circ-Spl.		Carter	Vacuum.	Single.	Delco	Hand.	Dyneto	6	Lycoming.	Disk...
Geronimo.....A-45	122	6	3½x5	230	Rutenber.	L.	Helical	Cent.	Splash-Pres.	Piston.	Stromberg.	Vacuum.	Single.	Delco	Hand.	Dyneto	6	Borg & Beck	Plate...
Ghent.....6-60	125	6	3½x5½	303	Continent.	L.	Helical	Cent.	Splash-Pres.	Piston.	Stromberg.	Vacuum.	Single.	Connecticut.	Hand.	Auto-Lite	6	Borg & Beck	Plate...
Glide.....6-40	119	6	3½x5	230	Rutenber.	L.	Helical	Cent.	Splash-Pres.	Piston.	Rayfield	Vacuum.	Single.	Westinghouse	Hand.	Westinghouse	6	Own	Disk...
Grant.....G	114	6	3 x4¼	180	Own	I.	Helical	Ther.	Circ-Spl.	Piston.	Stromberg.	Vacuum.	Single.	Remy	Atmtc	Wagner	6	Durston	Cone...
Hackett.....A L	112	4	3⅜x4¼	188	Own	L.	Chain	Ther.	Splash-Pres.	Piston.	Dave Buick.	Vacuum.	Single.	Connecticut.	Hand.	Dyneto	6		Disk...
Hal.....21-A	135	12	2½x5	389	Weidely.	I.	Helical	Cent.	Pressure	Gear	Stromberg.	Vacuum.	Dual	Remy	Hand	Westinghouse	6	Borg & Beck	Plate...
Harroun.....	106	4	3½x5½	174	Own	I.	Helical	Ther.	Circ-Spl.	Piston.	Stromberg.	Vacuum.	Single.	At Kent	Hand.	Remy	6	Own	Cone...
Harvard.....4-20	100	4	3x4¼	120	Sterling	I.	Helical	Ther.	Circ-Spl.	Gear	Zenith	Gravity.	Single.	At Kent	Atmtc	Wagner	6	Detroit	Cone... Disk...
Haynes.....38	121	6	3½x5	289	Own	L.	Helical	Cent.	Circ-Spl.	Piston.	Rayfield	Vacuum.	Single.	Remy	Hand.	Leece-N	6	Borg & Beck	Plate...
Haynes.....39	127	6	3½x6	346	Own	L.	Helical	Cent.	Circ-Spl.	Piston.	Rayfield	Vacuum.	Single.	Remy	Hand.	Leece-N	6	Borg & Beck	Plate...
Haynes.....44	127	12	2½x5	356	Own	I.	Chain	Cent.	Pressure	Gear	Rayfield	Vacuum.	Single.	Delco	H&A.	Leece-N	6	Borg & Beck	Plate...
Hollier.....196	116	6	3 x4½	180	Falls	I.	Helical	Ther.	Circ-Spl.	Gear	Stewart	Vacuum.	Single.	Remy	Hand.	Splitdorf	12	Own	Cone...
Hollier.....206	116	6	3½x4½	224	Continent.	L.	Helical	Cent.	Splash-Pres.	Gear	Stewart	Vacuum.	Single.	Remy	Hand.	Splitdorf	12	Borg & Beck	Plate...
Hollier.....188	116	8	3 x4½	180	Own	L.	Helical	Ther.	Pressure	Gear	Stewart	Vacuum.	Single.	At Kent	Atmtc	Splitdorf	12	Own	Cone...
Homer-Laughlin.....D	112	8	2½x3¾	117	Own		Chain	Ther.	Circ-Spl.		Zenith		Single.	At Kent	Atmtc	Disco	12	Own	
Hudson.....	125	6	3½x5	289	Own	L.	Helical	Cent.	Circ-Spl.	Piston.	Own	Vacuum.	Single.	Delco	H&A.	Delco	6	Own	Disk...
Hupmobile.....R	112	4	3½x5½	182	Own	L.	Chain	Ther.	Pressure	Gear	Stromberg.	Vacuum.	Single.	At Kent	Hand.	Bijur	6	Own	Disk...
Inter-State.....T	110	4	3½x5	192	Beaver	I.	Helical	Ther.	Circ-Spl.	Gear	Schebler	Gravity.	Single.	Remy	Hand.	Rem	6	Own	Cone...
Jackson.....	118	8	3 x3½	198	Ferro	I.	Helical	Ther.	Pressure	Gear	Zenith	Vacuum.	Single.	Remy	S-A	Auto-Lite	6	Borg & Beck	Plate...
Jones.....26 AB	125	6	3½x5⅛	296	Lewis	L.	Helical	Cent.	Circ-Spl.	Piston.	Stromberg.	Vacuum.	Single.	Remy	Hand.	Auto-Lite	6	Borg & Beck	Plate...
Jordan.....J-60	127	6	3½x5½	303	Continent.	L.	Helical	Cent.	Splash-Pres.	Piston.	Stromberg.	Vacuum.	Single.	Bosch	Hand.	Bijur	6	Brown-Lipe.	Disk...
King.....EE	120	8	3 x5	283	Own	L.	Chain	Ther.	Pressure	Gear	Ball	Vacuum.	Single.	At Kent	Hand.	Bijur	6	Borg & Beck	Plate...
Kissel.....	117	6	3½x5	249	Own	L.	Helical	Cent.	Splash-Pres.	Gear	Stromberg.	Vacuum.	Single.	Remy	Hand.	Remy	6	T.W.Warner	Cone...
Kissel.....	128	12	2½x5	259	Weidely	I.	Helical	Cent.	Pressure	Gear	Stromberg.	Vacuum.	Single.	Delco	H&A.	Delco	6	Warner	Disk...
Kline.....6-38	120	6	3½x4½	224	Continent.	L.	Helical	Cent.	Splash-Pres	Piston.	Rayfield	Vacuum.	Single.	Westinghouse	Hand.	Westinghouse	6	Borg & Beck	Plate...
Lexington.....R	122	6	3½x4½	224	Continent.	L.	Helical	Cent.	Circ-Spl.	Piston.	Rayfield	Vacuum.	Single.	Connecticut.	Hand.	Westinghouse	6	Borg & Beck	Plate...
Liberty.....10-B	115	6	3½x4½	224	Continent.	L.	Helical	Ther.	Splash-Pres.	Piston.	Stromberg.	Vacuum.	Single.	Delco	Hand.	Delco	6	Borg & Beck	Plate...
Locomobile.....38	139	6	4½x5	426	Own	T.	Helical	Cent.	Splash-Pres.	Gear	Ball	Pressure.	Dual-D	Berling	Hand.	Westinghouse	6	Own	Disk...
Locomobile.....48	142	6	4½x5½	525	Own	T.	Helical	Cent.	Splash-Pres.	Gear	Ball	Pressure.	Dual-D	Berling	Hand.	Westinghouse	6	Own	Disk...
Madison.....	120	6	3½x5	230	Rutenber.	L.	Helical	Cent.	Splash-Pres.	Piston.	Rayfield	Vacuum.	Single.	Remy	Hand.	Remy	6	Muncie	Disk...
Madison.....	124	6	3½x5	230	Rutenber.	L.	Helical	Cent.	Circ-Spl.	Piston.	Rayfield	Vacuum.	Single.	Remy	Hand.	Remy	6	Muncie	Disk...
Maibohm.....A	105	4	3½x4	123	Own	L.	Helical	Ther.	Splash-Pres.	Piston.	Zenith	Gravity.	Single.	At Kent	Atmtc	Disco	12	Mechanics.	Disk...
Maibohm.....B	115	6	3½x4¼	196	Falls	I.	Helical	Ther.	Splash-Pres.	Piston.	Stromberg.	Vacuum.	Single.	At Kent	Hand.	Wagner	6	Borg & Beck	Plate...
Marion-Handley.....A	120	6	3½x5	230	Rutenber.	L.	Helical	Cent.	Circ-Spl.	Piston.	Stromberg.	Vacuum.	Single.	At Kent	Hand.	Westinghouse	6		Disk...
Marion-Handley.....B	125	6	3½x5¼	303	Continent.	L.	Helical	Cent.	Splash-Pres.	Piston.	Stromberg.	Vacuum.	Single.	Westinghouse	Hand.	Westinghouse	6		Disk...
Marmon.....34	136	6	3⅞x5½	340	Own	I.	Helical	Cent.	Pressure	Gear	Stromberg.	Gravity.	Single.	Bosch	Hand.	Bijur	6	Own	Cone...
Maxwell.....25	109	4	3⅜x4½	170	Own	L.	Helical	Ther.	Splash-Pres.	Piston.	K. D.	Gravity.	Single.	At Kent	Hand.	Simms-Huff.	12	Own	Cone...
McFarlan.....X	136	6	4½x6	572	Teet-Hart.	T.	Helical	Cent.	Splash-Pres.	Piston.	Stromberg.	Vacuum.	Double.	Eisemann	Hand.	Westinghouse	6	Borg & Beck	Plate...
Mercer.....	115	4	3⅜x6¾	298	Own	L.	Chain	Cent.	Pressure	Gear	Zenith	Vacuum.	Single.	Bosch	Hand.	U-S-L		Own	Disk...
Mercer.....	132	4	3⅜x6¾	298	Own	L.	Chain	Cent.	Pressure	Gear		Vacuum.	Single.		Hand.			Own	Disk...
Metz.....25	108	4	3⅞x4	189	Own	L.	Helical	Ther.	Circ-Spl.	Gear	A.W.T.	Gravity.	Single.	At Kent	Fixed.	Westinghouse	6	Own	

ABBREVIATIONS

2-pt—*Two Point*
¾ Ell—¾ *Elliptic*
¾ Float—¾ *Floating*
¾ Plat—¾ *Platform*
Amid—*Amidships*
Atmtc—Automatic
B & P—*Ball and Plain*
B & R—*Ball and Roller*
B R & P—*Ball, Roller and Plain*
C & C—*Cup and Cone*
Cant—*Cantilever*
Cent—*Centrifugal*
Circ-Spl—*Circulating Splash*
Dual-D—*Dual Double*
Ell—*Elliptic*
F—*F-Head*
Float—*Floating*
Fric—*Friction*
Gear—*Gear Pump*
H—*Horizontal*
H & A—*Hand and Automatic*
I—*I-Head*
Imp—*Impeller*
K—*Knight type*
L—*L-Head*
Mag—*Magnetic*
Non-Spl—*Non-Circulating Splash*
Opt—*Optional*
Plan—*Planetary*
Plat—*Platform*
Rad-Rd—*Radius Rods*
Rev-C—*Reversed Cone*
Roll—*Roller*
S-A—*Semi-Automatic*
S-E—*Semi-Elliptic*
Semi-F—*Semi-Floating*
Sp.B—*Spiral Bevel*
Sp.G—*Spiral Gear*

Their Technical Specifications—Continued

TRANSMISSION							Gear Ratio on Direct	RUNNING GEAR				Make of Steering Gear	Make of Speedometer	Crankshaft Bearings and Number	BEARINGS			MAKE AND MODEL
GEARSET			Final Drive	Torque Taken By	Make of Rear Axle	Rear Axle Type		TIRES		Wheels	Rear Spr'gs				Gearset	Rear Axle	Front Wheel	
Make	Location	Forward Speeds						Front	Rear									
Mechanics	Unit M	3	Bevel	Tor-T	West-M	¾ Float	4.00–1	34x4	34x4	Opt	¾ Ell	C. A. S.	Stewart	Plain 3	B&P	B&R	Ball	**Empire** 71
Mechanics	Unit-M	3	Sp.B	Springs	Hess	Float	4.58–1	34x4	34x4	Opt	S-E	C. A. S.	Stewart	Plain 3	B&P	B&R	Ball	**Empire** 73
Own	Amid	3	Bevel	Springs	Own	Semi-F	1.50–1	34x4½	34x4½	Wire	S-E	Gemmer	Stewart	Plain 7	Ball	Roll	Roll	**Fageol**
Own	Amid	3	Sp.B	Tor-T	Own	Semi-F	4.00–1 / 4.75–1	33x4½	33x4½	Opt	Cant	Own		Plain 3	Plain	B&P	Ball	**Fergus**
Own	Amid	4	Sp.B	Tor-T	Own	Semi-F	2.75–1	35x5	35x5	Wood	S-E	Own	Stewart	Plain 3	Plain	Ball	Ball	**Fiat** E–17
Own	Plan	2	Bevel	Tor-T / Rad-Rd	Own	Semi-F	3.64–1	30x3	30x3½	Wood	Tr.S-E	Own	None	Plain 3	Plain	Roll	Ball	**Ford** T
Own	Amid	3	Sp.B	Springs	Own	Semi-F	4.33–1	32x4 / 33x4½	32x4 / 33x4½	Wood	Ell	Own	Stewart	Plain 7	Ball	Ball	Ball	**Franklin** 9
Own	Amid	4	Bevel	Tor-T	Own	Float	3.00–1	36x4½	36x5	Wire	S-E	Own	Opt	Plain 3	Ball	Ball	Ball	**F.R.P** 45B
Mechanics	Unit M	3	Bevel	Tor-T	Adams	Float	4.00–1	32x3½	32x3½	Wood	Cant	C. A. S.	Stewart	Plain 2	Plain	Ball	Ball	**Geronimo**
Dundore	Unit M	3	Sp.B	Springs	W-Weiss	¾ Float	4.50–1	32x4	32x4	Wood	S-E	C. A. S.	Stewart	Plain 3	Ball	Roll	Ball	**Geronimo** A–45
Grant-Lees	Unit M	3	Sp.B	Springs	Standard	¾ Float	4.33–1	34x4	34x4	Opt	S-E	Lavine	Stewart	Plain 3	Ball	B&R	Roll	**Ghent** 6–60
Own	Unit-M	3	Sp.B	Springs	American	¾ Float	4.64–1	34x4	34x4	Wood	¾ El	Lavine	Stewart	Plain 3	B&P	Ball	Ball	**Glide** 6–40
Durston	Unit M	3	Bevel	Tor-T	Peru	Float	4.50–1	32x3½	32x3½	Opt	Cant	Jacox	Van Sicklen	Plain 3	B&P	B&R	Roll	**Grant** G
Grant-Lees	Unit M	3	Bevel	Springs	W-Weiss	Semi-F	4.00–1	32x3½	32x3½	Wood	¾ Ell	Jacox	Stewart	Plain 3	Ball	Roll	Ball	**Hackett** A L
Grant-Lees	Unit M	3	Sp.B	Springs	Timken	Float	4.45–1	34x4½	34x4½	Wood†	S-E	Gemmer	Van Sicklen	Plain 3	B&R	Roll	Roll	**Hal** 21–A
Mechanics	Unit M	3	Bevel	Tor-T	Own	¾ Float	4.00–1	30x3½	30x3½	Wood	Cant	C. A. S.	Stewart	Plain 3	B&P	B&R	Roll	**Harroun**
Detroit	Unit M	3	Bevel	Springs	Detroit	Semi-F	4.00–1	28x3	28x3	Opt	Cant	Barnes	Stewart	Plain 3	B&P	B&R	Ball	**Harvard** 4–20
Own	Unit M	3	Sp.B	Springs	Own	¾ Float	4.42–1	34x4	34x4	Wood	S-E	Jacox	Stewart	Plain 3	Ball	Ball	Ball	**Haynes** 38
Own	Unit M	3	Sp.B	Springs	Own	¾ Float	4.42–1	35x4½	35x4½	Wood	S-E	Jacox	Stewart	Plain 3	B&P	B&P	Ball	**Haynes** 39
Own	Unit M	3	Sp.B	Springs	Own	¾ Float	4.07–1	34x4½	34x4½	Wire	S-E	Jacox	Warner	Plain 3	Ball	Ball	Ball	**Haynes** 44
Own	Unit M	2	Sp.B	Tor-T	Own	Float	4.50–1	32x3½	32x3½	Wood	Cant	Own	Stewart	Plain 3	Ball	Ball	Ball	**Hollier** 196
Own	Unit M	3	Sp.B	Tor-T	Own	Float	4.50–1	32x4	32x4	Wood†	Cant	Own	Stewart	Plain 3	Ball	Ball	Ball	**Hollier** 206
Own	Unit-M	2	Sp.B	Tor-T	Own	Float	4.50–1	34x4	34x4	Wood	Cant	Own	Stewart	Plain 3	Ball	Ball	Ball	**Hollier** 188
Friction	Amid		Chain	Rad-Rd	Own	Dead		30x3½	30x3½	Wire	Cant	Warner	Stewart	Ball 2	Ball	Ball	Ball	**Homer–Laughlin** D
Own	Unit M	3	Sp.B	Springs	Timken	¾ Float	*4.08–1	34x4	34x4	Wood†	S-E	Gemmer	Stewart	Plain 4	Roll	Roll	Roll	**Hudson**
Own	Unit M	3	Sp.B	Springs	Own	¾ Float	4.91–1	32x4	32x4	Wood	S-E	Jacox	Van Sicklen	Plain 3	B&P	Roll	Ball	**Hupmobile** R
Durston	Unit X	3	Bevel	Tor-T	Peru	¾ Float	4.00–1	33x4	33x4	Opt	¾ Ell	T.W.Warner	Stewart	Plain 3	B&R	Roll	Ball	**Inter–State** T
Covert	Unit M	3	Sp.B	Springs	Salisbury	¾ Float	5.27–1	37x4	37x4	Wood	Ell	Foster	Stewart	Plain 3	Roll	Roll	Ball	**Jackson**
Covert	Unit M	3	Sp.B	Springs	Timken	¾ Float	4.45–1	34x4	34x4	Wood	S-E	T.W.Warner	Stewart	Plain 3	Roll	Roll	Roll	**Jones** 26 AB
Brown-Lipe	Unit M	3	Sp.B	Springs	Timken	Semi-F	4.45–1	35x4½	35x4½	Wood	S-E	Gemmer	Van Sicklen	Plain 3	B&P	Roll	B&R	**Jordan** J–60
Own	Unit M	3	Sp.B	Tor-A	Columbia	Float	4.58–1	34x4	34x4	Wood	Cant	Jacox	Stewart	Plain 3	BR&P	Roll	Roll	**King** EE
T.W.Warner	Unit M	3	Sp.B	Springs	Own	Float	4.58–1	34x4	34x4	Wood	¾Ell	Jacox	Stewart	Plain 3	R&P	Roll	Roll	**Kissel**
Warner	Unit M	3	Sp.B	Springs	Own	Float	4.58–1	34x4½	34x4½	Wood	¾ Ell	Jacox	Stewart	Plain 3	B&R	Roll	Roll	**Kissel**
Grant-Lees	Unit M	3	Sp.B	Springs	Hess	Float	4.33–1	34x4	34x4	Wood†	¾ Ell	Lavine	Stewart	Plain 3	Ball	Roll	Roll	**Kline** 6–38
Warner	Unit M	3	Sp.B	Springs	Hess	¾Float	5.00–1	34x4	34x4	Wood†	S-E	Warner	Stewart	Plain 3	Ball	Roll	Ball	**Lexington** R
Detroit	Unit M	3	Sp.B	Springs	Timken	Semi-F	4.75–1	32x4	32x4	Wood	S-E	Warner	Stewart	Plain 3	Ball	Roll	Roll	**Liberty** 10–B
Own	Amid	4	Sp.B	Tor-T	Own	Float	3.85–1	36½x4½	37x5	Wood	¾ Ell	Own	Warner	Plain 7	Ball	Ball	Roll	**Locomobile** 38
Own	Amid	4	Sp.B	Tor-A	Own	Float	3.85–1	37x5	37x5	Wood	¾ Ell	Own	Warner	Plain 7	Ball	Ball	Roll	**Locomobile** 48
Muncie	Unit M	3	Sp.B	Springs	Salisbury	¾ Float	4.42–1	34x4	34x4	Wood	¾ Ell	Warner	Stewart	Plain 3	B&P	Ball	Ball	**Madison**
Muncie	Unit M	3	Sp.B	Springs	Salisbury	¾ Float	4.42–1	34x4	34x4	Wood	¾ Ell	Warner	Stewart	Plain 3	B&P	Ball	Ball	**Madison**
Mechanics	Unit M	3	Sp.B	Springs	W-Weiss	Float	4.25–1	30x3½	30x3½	Opt	S-E	Jacox	Stewart	Plain 2	Ball	Roll	Ball	**Maibohm** A
Mechanics	Unit M	3	Sp.B	Springs	Peru	Float	4.25–1	32x3½	32x3½	Opt	S-E	Jacox	Stewart	Plain 3	Ball	Roll	Ball	**Maibohm** B
Muncie	Unit M	3	Sp.B	Springs	Salisbury	Float	4.41–1	32x4	34x4	Wood†	S-E	Warner	Stewart	Plain 3	B&P	Roll	Ball	**Marion–Handley** A
Muncie	Unit M	3	Sp.B	Springs	Salisbury	Float	4.07–1	35x4½	35x4½	Wood†	S-E	Warner	Stewart	Plain 3	Ball	Roll	Ball	**Marion–Handley** B
Own	Unit T	3	Sp.B	Tor-T	Own	¾ Float	3.69–1	32x4½	32x4½	Wire	Brush	Gemmer	Van Sicklen	Plain 4	BR&P	B&R	Roll	**Marmon** 34
Own	Unit M	3	Bevel	Tor-T	Own	¾ Float	3.58–1	30x3½	30x3½	Opt	S-E	Own	Stewart	Plain 2	R&P	Roll	Ball	**Maxwell** 25
Brown-Lipe	Amid	3	Sp.B	Springs	Timken	Float	3.50–1	35x5	35x5	Opt	S-E	Warner	Warner	Plain 4	Roll	Roll	Roll	**McFarlan** X
Own	Amid	4	Sp.B	Springs	Own	Float	3.22–1	32x4	32x4	Wire	S-E			Plain 3	Ball	Roll	Roll	**Mercer**
Own	Amid	4	Sp.B	Springs	Own	Float	3.87–1	32x4½	32x4½	Wire	S-E			Plain 3	Ball	B&R	Roll	**Mercer**
Friction		7	Chain	Springs	Own			32x3½	32x3½	Opt	Ell	Own	Stewart	Plain 3		Roll	Ball	**Metz** 25

Splash-Pres—*Splash Pressure*
Spur—*Spur Gears*
T—*T-Head*
Ther—*Thermo-Syphon*
Tor-A—*Torsion Arm*
Tor-R—*Torsion Rod*
Tor-T—*Torsion Tube*
Tr S-E—*Tranverse Semi-Elliptic*
Unit-M—*Unit with Motor*
Unit-T—*Unit with Torque Tube*
Unit-X—*Unit with Axle*
Vib-Dup—*Vibrating Duplex*
†—*Wire Extra*
*—*Also available* 4.45-1, 3.80-1 and 4.90-1

EQUIPMENT

Allis-Ch—*Allis-Chalmers*
At Kent—*Atwater Kent*
A. W. T.—*American Watch Tool Co.*
Continent—*Continental*
Cut-Hammer—*Cutler-Hammer*
G.B.&S.—*Golden, Belknap & Swartz*
G. & D.—*Gray & Davis*
Gen. Elec.—*General Electric*
Hersh-Sp—*Herschell-Spillman*
Johns-Man—*Johns-Manville*
Leece-N—*Leece-Neville*
Longmare—*Longuemare*
Mass-Ph—*Massnick-Phipps*
Mer & Evans—*Merchant & Evans*
Reichbch—*Reichenbach*
Rob-Myers—*Robbins & Myers*
Shkspere—*Shakespeare*
Teet-Hart—*Teetor-Hartley*
U-S-L—*U. S. Light & Heating Corp.*
W-Weiss—*Walker-Weiss*
Ward-L—*Ward Leonard*
West-M—*Weston-Mott*

1918 Passenger Automobiles Listed with

MAKE AND MODEL	Wheel-base	No. of Cylinders	Bore and Stroke, Inches	Piston Displacement, Cubic Inches	Make of Engine	Cylinder Shape	Cam-shaft Drive	Water Circulation	LUBRICATION		CARBURETION		IGNITION			ELECTRIC SYS.		CLUTCH	
									System	Type of Pump	Make of Carbureter	Fuel Feed	System	Make	Control	Generator Make	Voltage	Make	Type
Mitchell D-40	120	6	3¼x5	249	Own	L.	Helical	Cent	Splash-Pres	Piston	Rayfield	Vacuum	Single	Connecticut	Hand	Splitdorf	6	Own	Cone
Mitchell C-42	127	6	3¼x5	289	Own	L.	Helical	Cent	Splash-Pres	Piston	Stromberg	Vacuum	Single	Connecticut	Hand	Westinghouse	6	Own	Cone
Moline-Knight C	118	4	3¾x5	221	Own	K.	Chain	Ther	Pressure	Gear	Schebler	Vacuum	Single	Connecticut	Hand	Wagner	6	Own	Cone
Moline-Knight G	122	4	4 x6	302	Own	K.	Chain	Ther	Pressure	Gear	Schebler	Vacuum	Single	Connecticut	Hand	Wagner	6	Own	Cone
Monitor	117	6	3½x4½	224	Continent	L.	Helical	Cent	Splash-Pres		Stromberg	Vacuum	Dual	Heinze	Hand	Heinze	6	Borg & Beck	Plate
Monroe M-3	96	4	3 x4¼	120	Sterling	I.	Helical	Ther	Circ-Spl	Piston	Zenith	Vacuum	Single	Connecticut	Hand	Auto-Lite	6	Mechanics	Disk
Monroe M-6	115	4	3¼x4½	149	Own	I.	Helical	Ther	Splash-Pres	Gear	Zenith	Vacuum	Single	Connecticut	Hand	Auto-Lite	6	Mechanics	Disk
Moon 6-36	114	6	2⅞x4½	165	Continent	L.	Helical	Ther	Splash-Pres	Piston	Tillotson	Gravity	Single	Delco	Hand	Wagner	6	Detlaff	Disk
Moon 6-45	125	6	3¼x4½	224	Continent	L.	Helical	Cent	Splash-Pres	Piston	Rayfield	Vacuum	Single	Delco	Hand	Delco	6	Borg & Beck	Plate
Moon 6-66	125	6	3½x5½	303	Continent	L.	Helical	Cent	Splash-Pres	Piston	Rayfield	Vacuum	Single	Delco	Atmtc	Delco	6	Borg & Beck	Plate
Moore 30-E	106	4	3¾x4¼	188	G.B.& S	L.	Chain	Ther	Splash-Pres	Piston	Schebler	Gravity	Single		Hand	Dyneto	6	G.B. & S	Disk
Moore 30	108	4	3¾x4¼	188	G.B.& S	L.	Chain	Ther	Circ-Spl	Piston	Schebler	Vacuum	Single	Splitdorf	Hand	Dyneto	6	G.B. & S	Disk
Murray	128	8	3¼x5	332	Hersh-Sp	L.	Helical	Cent	Pressure	Gear	Zenith	Vacuum	Single	Splitdorf	Hand	Westinghouse	6	Borg & Beck	Plate
Nash 681-683	121	6	3¼x5	249	Own	I.	Helical	Cent	Splash-Pres	Gear	Marvel	Vacuum	Single	Delco	H&A	Delco	6	Borg & Beck	Plate
Nash 671	125	6	3½x4⅝	267	Own	L.	Chain	Cent	Splash-Pres	Gear	Rayfield	Vacuum	Single	Delco	Hand	Bijur	6	Borg & Beck	Plate
Nash 684	127	6	3¼x5	249	Own	I.	Helical	Cent	Splash-Pres	Gear	Marvel	Vacuum	Single	Delco	H&A	Delco	6	Borg & Beck	Plate
National	128	6	3½x5½	303	Own	L.	Helical	Cent	Splash-Pres	Gear	Rayfield	Vacuum	Single	Splitdorf	Hand	Westinghouse	6	Own	Cone
National	128	12	2⅝x4½	370	Own	L.	Helical	Cent	Pressure	Gear	Rayfield	Vacuum	Single	Delco	Hand	Bijur	6	Own	Cone
Nelson	104	4	3⅛x4¾	146	Own	I.	Helical	Ther	Pressure	Gear	Zenith	Vacuum	Single	Bosch	Hand	U-S-L	12	Own	Disk
Oakland 34B	112	6	2 13/16x4¾	177	Northway	I.	Helical	Cent	Splash-Pres	Gear	Marvel	Vacuum	Single	Remy	Hand	Remy	6	Northway	Cone
Oldsmobile 37	112	6	2 13/16x4¾	177	Northway	I.	Helical	Cent	Pressure	Gear	Johnson	Vacuum	Single	Remy	Hand	Remy	6	Northway	Cone
Oldsmobile 45A	120	8	2⅞x4¾	247	Own	L.	Helical	Cent	Pressure	Gear	Ball	Vacuum	Single	Delco	H&A	Delco	6	Own	Cone
Olympian	114	4	3¼x4½	149	Own	I.	Helical	Ther	Pressure	Gear	Stromberg	Vacuum	Single	At Kent	Hand	Wagner	6	Own	Disk
Overland 85	112	4	4⅛x4½	240	Own	L.	Helical	Ther	Circ-Spl	Gear	Tillotson	Vacuum	Single		Hand	Auto-Lite	6	Auto-Lite	Cone
Overland 90	104 / 106	4	3⅜x5	178	Own	L.	Helical	Ther	Circ-Spl	Piston	Tillotson	Vacuum	Single		Hand	Auto-Lite	6	Auto-Lite	Cone
Overland 85	116	6	3¼x4½	224	Continent	L.	Helical	Cent	Splash-Pres	Piston	Tillotson	Vacuum	Single		Hand	Auto-Lite	6	Auto-Lite	Cone
Owen Magnetic W-42	142	6	4 x5½	415	Own	I.	Sp-G	Cent	Pressure	Gear	Zenith	Vacuum	Single	Bosch	Hand	Own	24		
Packard 3-25 & 3-35	128 / 136	12	3 x5	424	Own	L.	Chain	Cent	Pressure	Gear	Own	Pressure	Single	Delco	H&A	Bijur	6	Own	Plate
Paige 6-39	117	6	3¼x5	230	Rutenber	L.	Helical	Cent	Splash-Pres	Piston	Stromberg	Gravity	Single	Remy	Hand	G&D	6	Borg & Beck	Plate
Paige 6-55	127	6	3½x5¼	303	Continent	L.	Helical	Cent	Splash-Pres	Piston	Rayfield	Vacuum	Single	Remy	Hand	Remy	6	Borg & Beck	Plate
Pan American G-5	120	6	3¼x5	230	Rutenber	L.	Helical	Cent	Splash-Pres	Piston	Rayfield	Vacuum	Single	G&D	Hand	G&D	6	Borg & Beck	Plate
Pan American J-7	128	6	3½x5¼	303	Continent	L.	Helical	Cent	Splash-Pres	Piston	Rayfield	Vacuum	Single	Bosch	Hand	G&D	6	Borg & Beck	Plate
Paterson 6-45	120	6	3¼x4½	224	Continent	L.	Helical	Cent	Splash-Pres	Piston	Stromberg	Vacuum	Dual	Delco	Hand	Delco	6	Detroit	Cone
Peerless 56	125	8	3¼x5	332	Own	L.	Helical	Cent	Pressure	Gear	Ball	Vacuum	Single	At Kent	H&A	Auto-Lite	6	Brown-Lipe	Disk
Pennsy	115	4	3¾x4¼	199	G.B.& S	L.	Chain	Ther	Pressure	Piston	Carter	Vacuum	Single	Connecticut	Hand	Dyneto	6	G.B. & S	Disk
Pennsy	120	6	3¼x4½	224	Continent	L.	Helical	Cent	Splash-Pres	Gear	Rayfield	Vacuum	Single		Hand	Heinze	6	Borg & Beck	Plate
Phianna M		4	3 5/8x6	287	Own	L.	Chain	Cent	Pressure	Gear	H & N	Vacuum	Single	Bosch	Hand	Ward-L	6		Disk
Pierce-Arrow C-4	134	6	4 x5½	415	Own	T.	Helical	Cent	Pressure	Gear	Own	Pressure	Double	Bosch, West	Hand	Westinghouse	6	Own	Cone
Pierce-Arrow B-4	142	6	4½x5½	525	Own	T.	Helical	Cent	Pressure	Gear	Own	Pressure	Double	Bosch, West	Hand	Westinghouse	6	Own	Cone
Pierce-Arrow A-4	147½	6	5 x7	825	Own	T.	Helical	Cent	Pressure	Gear	Own	Pressure	Double	Bosch, West	Hand	Westinghouse	6	Own	Cone
Pilot 6-45	119	6	3⅛x5	230	Teet-Hart	L.	Helical	Cent	Splash-Pres	Piston	Tillotson	Vacuum	Single	Delco	Hand	Delco	6	Borg & Beck	Plate
Premier 6-C	125½	6	3⅜x5½	295	Own	I.	Helical	Cent	Splash-Pres	Gear	Johnson	Vacuum	Single	Delco	H&A	Delco	6	Borg & Beck	Plate
Princess 36-F	108	4	3¾x4¼	188	G.B. & S	L.	Chain	Ther	Circ-Spl	Piston	Schebler	Vacuum	Single	Splitdorf	Hand	Disco	6		Disk
Regal J	108	4	3½x4¾	163	Own	L.	Helical	Ther	Circ-Spl	Piston	Carter	Vacuum	Single	At Kent	Hand	Auto-Lite	6	Own	Cone
Reo R	115	4	4⅛x4½	240	Own	F.	Helical	Cent	Circ-Spl	Piston	Johnson	Vac.-Gra	Single	Remy	Hand	Remy	6	Own	Disk
Reo M	126	6	3 1/16x5⅛	307	Own	F.	Helical	Cent	Circ-Spl	Piston	Rayfield	Vacuum	Single	Remy	Hand	Remy	6	Own	Disk
Roamer D-4-75	128	4	4 x6	302	Dues'nb'rg	H.	Helical	Cent	Splash-Pres	Gear	Stromberg	Vacuum	Single	Bosch	Hand	Bijur	6	Borg & Beck	Plate
Roamer C-6-54	128	6	3½x5½	303	Continent	L.	Helical	Cent	Splash-Pres	Piston	Stromberg	Vacuum	Single	Bosch	Hand	Bijur	6	Borg & Beck	Plate
Roamer D-6-90	138	6	3¾x5½	381	Dues'nb'rg	H.	Chain	Cent	Splash-Pres	Gear	Stromberg	Vacuum	Single	Bosch	Hand	Bijur	6	Fuller	Disk
Saxon B-5	96	4	2¾x4	95	Continent	L.	Helical	Ther	Circ-Spl	Piston	Schebler	Gravity	Single	At Kent	Atmtc	Wagner	6	Own	Plate
Saxon S-4	112	6	2¾x4½	175	Continent	L.	Helical	Ther	Circ-Spl	Piston	Stromberg	Gravity	Single	Remy	Hand	Wagner	6	Own	Plate
Sayers	118	6	3¼x4½	224	Continent	L.	Helical	Cent	Splash-Pres	Piston	Zenith	Vacuum	Single	Delco	Hand	Delco	6	Borg & Beck	Plate
Scripps-Booth G	110	4	3 1/16x4	171	Mason	I.	Helical	Cent	Splash-Pres	Gear	Zenith	Vacuum	Single	Remy	Atmtc	Remy	6	Mason	Cone

ABBREVIATIONS

2-pt—*Two Point*
¾ Ell—¾ *Elliptic*
¾ Float—¾ *Floating*
¾ Plat—¾ *Platform*
Amid—*Amidships*
Atmtc—*Automatic*
B & P—*Ball and Plain*
B & R—*Ball and Roller*
B R & P—*Ball, Roller and Plain*
C & C—*Cup and Cone*
Cant—*Cantilever*
Cent—*Centrifugal*
Circ-Spl—*Circulating Splash*
Dual-D—*Dual Double*
Ell—*Elliptic*
F—*F-Head*
Float—*Floating*
Fric—*Friction*
Gear—*Gear Pump*
H—*Horizontal*
H & A—*Hand and Automatic*
I—*I-Head*
Imp—*Impeller*
K—*Knight type*
L—*L-Head*
Mag—*Magnetic*
Non-Spl—*Non-Circulating Splash*
Opt—*Optional*
Plan—*Planetary*
Plat—*Platform*
Rad-Rd—*Radius Rods*
Rev-C—*Reversed Cone*
Roll—*Roller*
S-A—*Semi-Automatic*
S-E—*Semi-Elliptic*
Semi-F—*Semi-Floating*
Sp.B—*Spiral Bevel*
Sp.G—*Spiral Gear*

Their Technical Specifications—Continued

TRANSMISSION								RUNNING GEAR							BEARINGS			
GEARSET			Final Drive	Torque Taken By	Make of Rear Axle	Rear Axle Type	Gear Ratio on Direct	TIRES		Wheels	Rear Spr'gs	Make of Steering Gear	Make of Speed-ometer	Crank-shaft Bearings and Number	Gearset	Rear Axle	Front Wheel	MAKE AND MODEL
Make	Location	Forward Speeds						Front	Rear									
Own	Unit T	3	Sp.B	Tor-T	Own	¾ Float	4.25–1	32x4	32x4	Wood	Cant	Own	Stewart	Plain 3	B&R	B&R	Roll	Mitchell D–40
Own	Unit T	3	Sp.B	Tor-T	Own	Float	4.25–1	34x4	34x4	Wood	Cant	Own	Stewart	Plain 3	B&R	Roll	Roll	Mitchell C–42
Warner	Amid	3	Sp.B	Tor-A	Timken	Semi-F	4.90–1	34x4	34x4	Wood	Brush	Jacox	Stewart	Plain 3	Roll	Roll	Roll	Moline-Knight C
Warner	Amid	3	Sp.B	Tor-A	Timken	Semi-F	4.00–1	35x4½	35x4½	Wood	Brush	Jacox	Stewart	Plain 3	Roll	Roll	Roll	Moline-Knight G
Grant-Lees	Unit M	3	Bevel	Springs	Adams	Float	4.08–1 / 4.50–1	33x4	33x4	Wood	¾ Ell	Foster	Stewart	Plain	Ball	B&R		Monitor
Mechanics	Unit M	3	Sp.B	Tor-T	W-Weiss	¾ Float	4.00–1	30x3 / 31x3½	30x3 / 31x3½	Wood	S-E	Jacox	Stewart	Plain 2	Ball	Ball	B&R	Monroe M–3
Mechanics	Unit M	3	Sp.B	Tor-T	Hess	Semi-F	4.80–1	32x4	32x4	Opt	Brush	Jacox	Stewart	Plain 2	Ball	Roll	Roll	Monroe M–6
Jacobson	Unit X	3	Sp.B	Tor-T	Jacobson	Semi-F	4.75–1	32x3½	32x3½	Wood	S-E	Ditwiler	Stewart	Plain 3	R&P	Roll	Roll	Moon 6–36
Grant-Lees	Unit M	3	Sp.B	Springs	Hess	Float	4.75–1	34x4	34x4	Wood	S-E	Gemmer	Van Sicklen	Plain 3	Ball	B&R	Ball	Moon 6–45
Warner	Unit M	3	Sp.B	Springs	Timken	Semi-F	4.45–1	35x4½	35x4½	Wood	S-E	Gemmer	Van Sicklen	Plain 3	Ball	Roll	Roll	Moon 6–66
Grant-Lees	Unit-M	3	Bevel	Tor-A	Peru	Float	4.25–1	30x3½	30x3½	Wood	Cant	Ditwiler	Stewart	Plain 3	Ball	Roll	Ball	Moore 30–E
Grant-Lees	Unit-M	3	Bevel	Tor-T	Peru	Float	4.25–1	30x3½	30x3½	Wood	Cant	Gemmer	Stewart	Plain 3	Ball	B&R	Ball	Moore 30
Covert	Unit M	3	Sp.B	Springs	Timken	Float	4.45–1 / 4.08–1	34x4½	34x4½	Wood	¾ Ell	Gemmer	Stewart	Plain 3	Ball	Roll	Roll	Murray
Own	Unit M	3	Sp.B	Springs	Own	Semi-F	4.50–1	34x4	34x4	Wood	S-E	Gemmer	Stewart	Plain 3	Roll	Roll	Roll	Nash 681–683
Own	Unit M	3	Sp.B	Springs	Own	Semi-F	4.50–1	34x4	34x4	Wood	¾ Ell	Gemmer	Van Sicklen	Plain 3	Roll	Roll	Roll	Nash 671
Own	Unit M	3	Sp.B	Springs	Own	Semi-F	4.50–1	34x4	34x4	Wood	S-E	Gemmer	Stewart	Plain 3	Roll	Roll	Roll	Nash 684
Warner	Unit M	3	Sp.B	Tor-A	Columbia	Float	4.58–1	34x4½	34x4½	Wood†	Cant	Warner	Warner	Plain 3	Ball	Roll	Ball	National
Warner	Unit M	3	Sp.B	Tor-A	Columbia	Float	4.58–1	34x4½	34x4½	Wood†	Cant	Warner	Warner	Plain 3	Ball	Roll	Roll	National
Own	Unit X	3	Sp.B	Rad-Rd	Own	Float	4.25–1	32x4	32x4	Wood	Trans	Own	Stewart	Plain 2	B&R	B&R	Ball	Nelson
T.W.Warner	Unit M	3	Bevel	Springs	West-M	Float	4.50–1	32x4	32x4	Wood	S-E	Jacox	Stewart	Plain 3	B&P	B&R	Ball	Oakland 34B
Northway	Unit M	3	Sp.B	Springs	West-M	Float	4.58–1	32x4	32x4	Wood	S-E	Jacox	Stewart	Plain 3	BR&P	B&R	Roll	Oldsmobile 37
Own	Unit M	3	Sp.B	Springs	West-M	Float	4.92–1	34x4	34x4	Wood	¾ Ell	Jacox	Stewart	Plain 2	BR&P	B&R	Roll	Oldsmobile 45A
Own	Unit M	3	Sp.B	Rad-Rd	Own	¾ Float	4.75–1	32x3½	32x3½	Opt	Trans	Warner	Stewart	Ball 2	Ball	Ball	Ball	Olympian
Own	Unit X		Bevel	Tor-T	Own	¾ Float	4.00–1	32x4	32x4	Wood	Cant	Own	Stewart	Plain 5	B&R	B&R	Roll	Overland 85
Own	Unit X		Bevel	Tor-T	Own	¾ Float	4.00–1	31x4	31x4	Wood	Cant	Own	Stewart	Plain 2	BR&P	B&R	Roll	Overland 90
Own	Unit X		Sp.B	Tor-T	Own	¾ Float	4.60–1	32x4	32x4	Wood	Cant	Own	Stewart	Plain 3	B&R	B&R	Roll	Overland 85
Magnetic	Unit M	6	Sp.B	Springs	American	Float	4.00–1	35x5	35x5	Opt	S-E	Own	Stewart	Plain 3		Roll	Roll	Owen Magnetic W–42
Own	Unit M	3	Sp.B	Tor-A	Own	Semi-F	4.36–1	35x5	35x5	Wood	S-E	Own	Waltham	Plain 3	B&R	Ball	Roll	Packard 3–25 & 3–35
Own	Unit M	3	Sp.B	Tor-T	Salisbury	¾ Float	4.42–1	32x4	32x4	Wood	Cant	Jacox	Stewart	Plain 3	BR&P	B&R	Roll	Paige 6–39
Own	Unit M	3	Sp.B	Tor-T	Salisbury	¾ Float	4.36–1	35x4½	35x4½	Wood	Cant	Jacox	Stewart	Plain 3	BR&P	B&R	Ball	Paige 6–55
Warner	Unit M	3	Sp.B	Springs	Timken	Semi-F	4.45–1	33x4½	33x4½	Wood	S-E	Warner	Stewart	Plain 3	Ball	Roll	Roll	Pan American G–5
Warner	Unit M	3	Sp.B	Springs	Timken	Semi-F	3.70–1	33x4½	34x5	Wood	S-E	Warner	Stewart	Plain 3	Ball	Roll	Roll	Pan American J–7
Detroit	Unit M	3	Sp.B	Springs	Hess	Float	4.50–1	32x4	32x4	Wood	¾ Ell	Jacox	Stewart	Plain	Plain	Roll	Ball	Paterson 6–45
Brown-Lipe	Unit M	3	Sp.B	Springs	Timken	Semi-F	4.90–1	35x4½	35x4½	Wood	Plat	Gemmer	Warner	Plain 3	B&R	Roll	Roll	Peerless 56
Grant-Lees	Unit M	3	Bevel	Springs	W-Weiss	Semi-F	4.00–1	32x3½	32x3½	Wood	S-E	Gemmer	Van Sicklen	Plain 3	Roll	Roll	Ball	Pennsy
Detroit	Unit M	3	Sp.B	Springs	Columbia	Float	4.58–1	33x4	33x4	Wood	¾ Ell	Gemmer	Van Sicklen	Plain 3	Ball	Roll	Ball	Pennsy
	Amid	4	Sp.B	Rad-Rd		Float	4.00–1	32x4½	32x4½	Opt	Cant		Warner	Plain 3	Ball	Roll	B&R	Phianna M
Own	Amid	4	Sp.B	Tor-T	Own	Semi-F	3.78–1	34x4½	34x4½	Wood	¾ Ell	Own	Warner	Plain 7	Ball	B&R	Roll	Pierce-Arrow C–4
Own	Amid	4	Sp.B	Tor-T	Own	Semi-F	3.53–1	35x5	35x5	Wood	¾ Ell	Own	Warner	Plain 7	Ball	B&R	Roll	Pierce-Arrow B–4
Own	Amid	4	Sp.B	Tor-T	Own	Semi-F	2.88–1	36x5½	36x5½	Wood	¾ Ell	Own	Warner	Plain 7	Ball	B&R	Roll	Pierce-Arrow A–4
Muncie	Unit M	3	Sp.B	Tor-T	Hess	¾ Float	4.25–1	32x4	32x4	Wood	Cant	C. A. S.	Stewart	Plain 3	B&R	B&R	Roll	Pilot 6–45
Detroit	Unit M	3	Sp.B	Springs	Timken	Semi-F	4.45–1	32x4½	32x4½	Wood	S-E	Warner	Warner	Plain 3	B&P	Roll	Roll	Premier 6–C
Grant-Lees	Unit M	3	Sp.B	Springs	Own	Float	4.25–1	32x3½	32x3½	Wood	¾ Ell		Van Sicklen	Plain 3	B&R	B&R	Ball	Princess 36–F
Grant-Lees	Unit M	3	Bevel	Tor-T	Peru	Float	4.25–1	30x3½	30x3½	Wood	Cant	C. A. S.	Stewart	Plain 3	Ball	B&R	Ball	Regal J
Own	Amid	3	Sp.B	Tor-A	Own	Semi-F	4.30–1	34x4	34x4	Wood	¾ Ell	Own	Stewart	Plain 3	Roll	Roll	Roll	Reo R
Own	Amid	3	Sp.B	Tor-A	Own	Float	4.30–1	34x4½	34x4½	Wood	Cant	Own	Stewart	Plain 3	Roll	Roll	Roll	Reo M
Grant-Lees	Unit M	3	Sp.B	Tor-T	Hess	¾ Float	3.77–1	32x4½	32x4½	Wire	S-E	Jacox	Stewart	Plain 3	B&R	Ball	Ball	Roamer D–4–75
Grant-Lees	Unit M	3	Sp.B	Tor-T	Hess	¾ Float	3.77–1	32x4	32x4	Wire	S-E	Jacox	Stewart	Plain 3	B&R	Ball	Ball	Roamer C–6–54
Fuller	Unit M	3	Sp.B	Tor-T	Timken	Float	3.50–1	34x4½	34x4½	Wire	S-E	Jacox	Warner	Plain 3	B&R	Ball	Roll	Roamer D–6–90
Own	Unit X	3	Sp.B	Tor-T	Timken	Semi-F	5.00–1	30x3	30x3	Wood	½ Ell	Own	Standard	Plain 2	BR&P	B&R	Ball	Saxon B–5
Own	Unit X	3	Sp.B	Tor-T	Timken	Semi-F	4.75–1	32x3½	32x3½	Opt	Cant	Warner	Stewart	Plain 3	BR&P	Roll	Roll	Saxon S–4
Mechanics	Unit M	3	Sp.B	Springs	Hess	¾ Float	4.75–1	32x4	32x4	Wood	S-E	Warner	Stewart	Plain 3	B&P	B&R	Ball	Sayers
T.W.Warner	Unit M	3	Bevel	Rad-Rd	W-Weiss	¾ Float	3.69–1 / 4.07–1	30x3½	30x3½	Wire	Cant	Jacox	Stewart	Plain 3	B&P		Ball	Scripps-Booth G

Splash-Pres—*Splash Pressure*
Spur—*Spur Gears*
T—*T-Head*
Ther—*Thermo-Syphon*
Tor-A—*Torsion Arm*
Tor-R—*Torsion Rod*
Tor-T—*Torsion Tube*
Tr S-E—*Tranverse Semi-Elliptic*
Unit-M—*Unit with Motor*
Unit-T—*Unit with Torque Tube*
Unit-X—*Unit with Axle*
Vib-Dup—*Vibrating Duplex*
†—*Wire Extra*

EQUIPMENT

Allis-Ch—*Allis-Chalmers*
At Kent—*Atwater Kent*
A. W. T.—*American Watch Tool Co.*
Continent—*Continental*
Cut-Hammer—*Cutler-Hammer*
G.B.&S.—*Golden, Belknap & Swartz*
G. & D.—*Gray & Davis*
Gen. Elec.—*General Electric*
Hersh-Sp—*Herschell-Spillman*
Johns-Man—*Johns-Manville*
Leece-N—*Leece-Neville*
Longmare—*Longuemare*
Mass-Ph—*Massnick-Phipps*
Mer & Evans—*Merchant & Evans*
Reichbch—*Reichenbach*
Rob-Myers—*Robbins & Myers*
Shkspere—*Shakespeare*
Teet-Hart—*Teetor-Hartley*
U-S-L—*U. S. Light & Heating Corp.*
W-Weiss—*Walker-Weiss*
Ward-L—*Ward Leonard*
West-M—*Weston-Mott*

1918 Passenger Automobiles Listed with

MAKE AND MODEL	Wheel-base	No. of Cylinders	Bore and Stroke, Inches	Piston Displacement, Cubic Inches	Make of Engine	Cylinder Shape	Cam-shaft Drive	Water Circulation	LUBRICATION		CARBURETION		IGNITION			ELECTRIC SYS.		CLUTCH	
									System	Type of Pump	Make of Carbureter	Fuel Feed	Sys-tem	Make	Con-trol	Generator Make	Voltage	Make	Type
Scripps-Booth H	120	8	2¾x3½	162	Ferro	I.	Helical	Ther.	Pressure	Gear	Zenith	Vacuum	Single	Remy	Atmtc	Wagner	6	Goodspeed	Disk
Seneca O	108	4	3¼x4½	138	LeRoi	F.	Helical	Ther.	Circ-Spl		Schebler	Vacuum	Single		Hand	Allis-Ch	6	Borg & Beck	Plate
Shad-Wyck A&B	128	6	3½x5½	303	Continent	L.	Helical	Cent.	Splash-Pres	Piston	Rayf.-Miller	Vacuum	Single	Eisemann	Hand	Westinghouse	6	Warner	Disk
Simplex V	143½	6	4¾x6½	564	Own	L.	Chain	Cent.	Splash-Pres	Gear	Newcomb	Pressure	Dual	Eisemann	Hand	Bosch	12	Own	Disk
Singer	139	6	4 x5½	414	Hersh-Sp	T.	Helical	Cent.	Pressure	Gear	Rayfield	Vacuum	Single	Bosch	Hand	Westinghouse	6	Muncie	Disk
Standard G	127	8	3½x5	332	Hersh-Sp	L.	Helical	Cent.	Pressure	Gear	Zenith	Vacuum	Single	Splitdorf	Hand	Westinghouse	6	Borg & Beck	Plate
States C	110	6	3 x4½	191	Own	L.	Helical	Ther.	Splash-Pres	Piston	Shkspere	Vacuum	VibDup	Connecticut	Hand	Dyneto	6	Borg & Beck	Plate
Stearns SKL	119	4	3⅞x5⅝	248	Own	K.	Chain	Cent.	Splash-Pres	Gear	Schebler	Vacuum	Single	Remy	Hand	Westinghouse	12	Own	Disk
Stearns SK	125	8	3½x5	332	Own	K.	Chain	Ther.	Splash-Pres	Gear	Rayfield	Vacuum	Single	Remy	Hand	Westinghouse	12	Own	Disk
Stephens	118	6	3½x4½	224	Own	I.	Helical	Ther.	Pressure	Gear	Stromberg	Vacuum	Single	Delco	Hand	Delco	6	Borg & Beck	Plate
Studebaker SH	112	4	3½x5	192	Own	L.	Helical	Cent.	Circ-Spl	Gear		Vacuum	Single	Remy	Hand	Wagner	6	Own	Cone
Studebaker EH	119	6	3½x5	289	Own	L.	Helical	Cent.	Circ-Spl	Gear		Vacuum	Single	Remy	Hand	Wagner	6	Own	Cone
Studebaker EG	126	6	3½x5	354	Own	L.	Helical	Cent.	Circ-Spl	Gear		Vacuum	Single	Remy	Hand	Wagner	6	Own	Cone
Stutz S	120	4	4¾x6	361	Own	T.	Helical	Cent.	Pressure	Gear	Stromberg	Pressure	Double	Remy	Hand	Remy	6	Own	Cone
Templar 445	118	4	3⅜x5½	197	Own	I.	Chain	Cent.	Pressure	Gear	Zenith	Vacuum	Single	Remy	S-A	Remy	6	Borg & Beck	Plate
Tulsa D	117½	4	3½x5	192	Lycoming	L.	Helical	Ther.	Circ-Spl	Piston	Rayfield	Vacuum	Single	Delco	Hand	Dyneto	6	Borg & Beck	Plate
Velie 38	115	6	3½x4½	224	Continent	L.	Helical	Cent.	Splash-Pres	Piston	Rayfield	Vacuum	Single	Remy	S-A	Remy	6	Borg & Beck	Plate
Velie 39	124	6	3½x5½	303	Continent	L.	Helical	Cent.	Splash-Pres	Piston	Rayfield	Vacuum	Single	Remy	S-A	Remy	6	Borg & Beck	Plate
Westcott	125	6	3½x5½	303	Continent	L.	Helical	Cent.	Splash-Pres	Piston	Rayfield	Vacuum	Single	Delco	S-A	Delco	6	Brown-Lipe	Disk
White	124½ / 137½	4	4½x5¾	326	Own	T.	Helical	Cent.	Pressure	Gear	Own	Vacuum	Single		Hand	Leece-N	12	Own	Disk
Willys 89	120	6	3½x5½	303	Continent	L.	Helical	Cent.	Splash-Pres	Piston	Tillotson	Vacuum	Single	Connecticut	Hand	Auto-Lite	6	Own	Cone
Willys-Knight 88	121	4	4½x4½	240	Own	K	Chain	Ther.	Splash-Pres	Piston	Tillotson	Vacuum	Single		Hand	Auto-Lite	6	Auto-Lite	Cone
Willys-Knight 88	125	8	3½x4	286	Own	K	Chain	Ther.	Splash-Pres	Piston	Zenith	Vacuum	Single	Remy	H&A	Auto-Lite	6	Auto-Lite	Cone
Winton 33	128	6	3¾x5½	348	Own	L.	Chain	Cent.	Pressure	Piston	Rayfield	Vacuum	Single	Bosch	Hand	Bijur	6		Disk
Winton 48	138	6	4½x5½	525	Own	L.	Chain	Cent.	Pressure	Piston	Rayfield	Vacuum	Single	Bosch	Hand	Bijur	6		Disk
Wolverine	115	4	3⅜x6	298	Dues'nb'rg	H.	Helical	Cent.	Circ-Spl	Piston	Miller	Vacuum	Single	Bosch	Hand	Bijur	6	Warner	Disk
Wolverine	125	4	4½x6	361	Dues'nb'rg	H.	Helical	Cent	Circ-Spl	Piston	Miller	Vacuum	Single	Bosch	Hand	Bijur	6	Warner	Disk
Woods Gas-Electric	124	4	2¾x4	95	Continent	L.	Helical	Ther.	Splash-Pres	Piston	Stromberg	Gravity	Single	At Kent	Atmtc	Own	60		
Yale M	126	8	3 x5	283	Colonial	T.	Chain	Ther.	Circ-Spl	Piston	Zenith	Vacuum	Single	Remy	Hand	Bijur	6	Detroit	Disk

ABBREVIATIONS

2-pt—*Two Point*
¾ Ell—¾ *Elliptic*
¾ Float—¾ *Floating*
¾ Plat—¾ *Platform*
Amid—*Amidships*
Atmtc—*Automatic*
B & P—*Ball and Plain*
B & R—*Ball and Roller*
B R & P—*Ball, Roller and Plain*
C & C—*Cup and Cone*
Cant—*Cantilever*
Cent—*Centrifugal*
Circ-Spl—*Circulating Splash*
Dual-D—*Dual Double*
Ell—*Elliptic*
F—*F-Head*
Float—*Floating*
Fric—*Friction*
Gear—*Gear Pump*
H—*Horizontal*
H & A—*Hand and Automatic*
I—*I-Head*
Imp—*Impeller*
K—*Knight type*
L—*L-Head*
Mag—*Magnetic*
Non-Spl—*Non-Circulating Splash*
Opt—*Optional*
Plan—*Planetary*
Plat—*Platform*
Rad-Rd—*Radius Rods*
Rev-C—*Reversed Cone*
Roll—*Roller*
S-A—*Semi-Automatic*
S-E—*Semi-Elliptic*
Semi-F—*Semi-Floating*
Sp.B—*Spiral Bevel*
Sp.G—*Spiral Gear*

1918 Steam-Driven

HAD steam cars received the impetus of quantity production which has blessed the gasoline car business, the public in general would be more informed as to the really remarkable developments in this field. The gasoline car of seven or eight years ago was truly a crude contrivance, and because of its tremendous growth the public has become familiarized with the improvements and knows that it is a far superior proposition. Although it is a less known fact it is nevertheless true that the steam car has developed on an equal plane with the gasoline car.

Here is what one gets in the present-day steamers: Start and stop on the throttle; a pulling power at low speeds that most gasoline cars cannot approach; and it will accelerate at a degree possible only in big multiple-cylinder gasoline cars and probably will excel most of them; it will climb hills at a high rate of speed or at a crawl; it will turn over the rear wheels on concrete with the front of the car against a wall; it is quiet, practically vibrationless, free from carbon trouble. There are no gears to shift.

Another thing which seems to be contrary to general opinion.

Name and Model	Wheel-base	Type of Boiler	Boiler Location	Type of Engine	Type of Valve Gear	Type of Valves	No. of Cylinders	Bore and Stroke	LUBRICATION		Engine Location	Final Drive	Fuel
									Cylinders	Engine			
Doble D	135	Water Tube	Under Hood	Dbl. Acting	Own		2	5x4			Rear Axle	Spur Gear	Kerosene
Stanley	130	Fire Tube	Under Hood	Dbl. Acting	Stephenson	Slide	2	4x5	Plunger Pump	Splash	Rear Axle	Spur Gear	Kerosene

Their Technical Specifications—Continued

TRANSMISSION								RUNNING GEAR								BEARINGS			
GEARSET								TIRES											
Make	Location	Forward Speeds	Final Drive	Torque Taken By	Make of Rear Axle	Rear Axle Type	Gear Ratio on Direct	Front	Rear	Wheels	Rear Spr'gs	Make of Steering Gear	Make of Speedometer	Crankshaft Bearings and Number	Gearset	Rear Axle	Front Wheel	MAKE AND MODEL
T.W.Warner	Unit M	3	Sp.B	Rad-Rd	Russel	¾ Float	4.80–1 5.33–1	32x4	32x4	Wire	Cant	Own	Stewart	Plain 2	B&P		Ball	Scripps-Booth H
Detroit	Unit M	3		Tor-T	Adams	Float	4.50–1	30x3½	30x3½	Wood†	Cant	Ditwiler	Stewart	Plain	Ball	Ball	Ball	Seneca O
Warner	Unit M	3	Sp.B	Springs	Timken	Semi-F	4.45–1	33x4½	33x4½	Wire	S-E	Gemmer	Van Sicklen	Plain 3	Ball	Roll	Roll	Shad-Wyck A&B
Own	Unit M	4	Sp.B	Springs	Own	Float	3.00–1	Opt	Opt	Opt	S-E	Own	Stewart	Plain 3	Roll	B&R	Roll	Simplex V
Muncie	Unit M	4	Sp.B	Tor-T	Timken	Float	3.70–1	35x5	35x5	Wire	Cant	Gemmer	Stewart	Plain 3	Ball	Roll	Roll	Singer
Grant-Lees	Unit M	3	Sp.B	Springs	Timken	Semi-F	4.45–1	34x4½	34x4½	Wood	S-E	Gemmer	Stewart	Plain 3	B&R	Roll	Roll	Standard G
Detroit	Unit M	3	Sp.B	Tor-T	Own	Float	4.00–1	30x3½	31x4	Wire	Cant	Own	Van Sicklen	Plain 3	Ball	B&R	Ball	States C
Own	Unit M	3	Sp.B	Tor-A	Own	Semi-F	4.50–1	34x4	34x4	Wood	Cant	Own	Stewart	Plain 3	B&R	B&R	Roll	Stearns SKL
Own	Unit M	3	Sp.B	Tor-A	Own	Semi-F	4.75–1	35x4½	35x4½	Wood	Cant	Own	Stewart	Plain 3			Roll	Stearns SK
Mechanics	Unit M	3	Sp.B	Springs	Hess	Float	4.75–1	32x4	32x4	Wood	S-E	Gemmer	Van Sicklen	Plain 3	Ball	Roll	Roll	Stephens
Own	Amid	3	Sp.B	Springs	Own	Semi-F	4.08–1	32x3½	32x3½	Wood	S-E	Own	Warner	Plain 3	R&P	Roll	Roll	Studebaker SH
Own	Amid	3	Sp.B	Springs	Own	Semi-F	4.00–1	32x4	32x4	Wood	S-E	Own	Warner	Plain 4	R&P	Roll	Roll	Studebaker EH
Own	Amid	3	Sp.B	Springs	Own	Semi-F	3.71–1	33x4½	33x4½	Wood	S-E	Own	Warner	Plain 4	R&P	Roll	Roll	Studebaker EG
Own	Unit X	3	Bevel	Tor-T	Own	¾ Float	3.50–1	32x4½	32x4½	Wire	S-E	Gemmer	Stewart	Plain 3	Ball	B&R	Roll	Stutz S
Detroit	Unit M	3	Sp.B	Springs	American	Semi-F	4.81–1	32x4	32x4	Wood	S-E	Jacox	Stewart	Plain 3	B&P	B&R	Roll	Templar 445
Grant-Lees	Unit M	3	Sp.B	Springs	Salisbury		4.50–1	32x	35x	Opt	S-E	C. A. S.	Stewart	Plain 2	Ball	B&R	Ball	Tulsa D
Durston	Unit M	3	Sp.B	Springs	Timken	Semi-F	4.75–1	32x4	32x4	Wood	¾ Ell	Gemmer	Stewart	Plain 3	Ball	Roll	Roll	Velie 38
Warner	Unit M	4	Sp.B	Springs	Timken	Semi-F	4.45–1	33x4½	33x4½	Wood	¾ Ell	Gemmer	Van Sicklen	Plain 3	Ball	Roll	Roll	Velie 39
Brown-Lipe	Unit M	3	Sp.B	Tor-T	Timken	¾ Float	4.45–1	35x4½	35x4½	Wood	Cant	Gemmer	Warner	Plain 3	B&R	Roll	Roll	Westcott
Own	Unit M	4	Sp.B	Springs	Own	Semi-F		35x5	35x5	Wood	S-E	Own	Stewart	Plain 3	Ball	Ball	Ball	White
Own	Unit X	3	Sp.B	Tor-T	Own	¾ Float	4.00–1	33x4½	33x4½	Opt	Cant	Own	Stewart	Plain 3	B&R	B&R	Roll	Willys 89
Own	Unit X	3	Sp.B	Tor-T	Own	Float	4.30–1	34x4½	34x4½	Wood	Cant	Own	Warner	Plain 3	BR&P	Roll	Roll	Willys-Knight 88
Own	Unit X	3	Sp.B	Tor-T	Own	Float	4.60–1	34x4½	34x4½	Wood	Cant	Own	Warner	Plain 2	BR&P	Roll	Roll	Willys-Knight 88
Own	Unit M	4	Sp.B	Tor-R	Own	Float	4.45–1	36x4½	36x4½	Wood	¾ Ell		Warner	Plain 4	B&R	Roll	Roll	Winton 33
Own	Unit M	4	Sp.B	Tor-R	Own	Float	4.08–1	37x5	37x5	Wood	¾ Ell		Warner	Plain 4	B&R	Roll	Roll	Winton 48
Warner	Unit M	3	Sp.B	Springs	American	Float	2.94–1	32x4½	32x4½	Wire	S-E	Warner	Warner	Plain 3	Ball	Roll	Roll	Wolverine
Warner	Unit M	3	Sp.B	Springs	American	Float	4.00–1	32x4½	32x4½	Wire	S-E	Warner	Warner	Plain 3	Ball	Roll	Roll	Wolverine
Electric	Unit M		Worm	Tor-A	Own	Semi-F	8.25–1	35x4½	35x4½	Wood	Cant	Gemmer	Stewart	Plain 3	None	B&R	Roll	Woods
Detroit	Unit M	3	Sp.B	Springs	Timken	Semi-F	4.50–1	34x4	34x4	Opt	S-E	Jacox	Stewart	Plain 3	Ball	Roll	Roll	Yale M

Splash-Pres—*Splash Pressure*
Spur—*Spur Gears*
T—*T-Head*
Ther—*Thermo-Syphon*
Tor-A—*Torsion Arm*
Tor-R—*Torsion Rod*
Tor-T—*Torsion Tube*
Tr S-E—*Tranverse Semi-Elliptic*
Unit-M—*Unit with Motor*
Unit-T—*Unit with Torque Tube*
Unit-X—*Unit with Axle*
Vib-Dup—*Vibrating Duplex*
†—*Wire Extra*

EQUIPMENT

Allis-Ch—*Allis-Chalmers*
At Kent—*Atwater Kent*
A. W. T.—*American Watch Tool Co.*
Continent—*Continental*
Cut-Hammer—*Cutler-Hammer*
G.B.&S.—*Golden, Belknap & Swartz*
G. & D.—*Gray & Davis*
Gen. Elec.—*General Electric*
Hersh-Sp—*Herschell-Spillman*
Johns-Man—*Johns-Manville*
Leece-N—*Leece-Neville*
Longmare—*Longuemare*
Mass-Ph—*Massnick-Phipps*
Mer & Evans—*Merchant & Evans*
Reichbch—*Reichenbach*
Rob-Myers—*Robbins & Myers*
Shkspere—*Shakespeare*
Teet-Hart—*Teetor-Hartley*
U-S-L—*U. S. Light & Heating Corp.*
W-Weiss—*Walker-Weiss*
Ward-L—*Ward Leonard*
West-M—*Weston-Mott*

Passenger Automobiles

The steam car is not a complicated and delicate piece of mechanism, requiring constant watching and an everlasting amount of attention. That was the steamer of six years ago—it was also the gasoline car of six years ago—but not so to-day. The delicate automatic contrivances have been eliminated. The complicated mechanism has been simplified so that it is an even less minute piece of mechanism than the gasoline chassis. What automatic features are still embodied are sturdy and require little attention.

Steam cars are capable of burning kerosene, and the drawback of finding a means of vaporizing the fuel is not evident as in gasoline cars. It heats itself with its own fire. Furthermore, one of these powerful cars, capable of climbing any grade upon which it can get traction and with a power performance not found in most of the largest gasoline engines will travel 12 miles on a gallon of this less expensive fuel. One has a few things to watch in a modern steam car. The burner jets must be kept clean and the tanks filled. This is about all.

Control	Fuel Feed	Type of Burner	Feed Water Control	Rear Axle Ratio	Car Drives Through	Torque Taken By	BEARINGS		Wheels		Speedometer	Rear Springs	Name and Model
							Rear Axle	Front Wheel					
Automatic	Pressure				Radius Rods		American		35x5	35x5		Semi-Elliptic	Doble D
Automatic	Pressure	Vaporizing	Automatic	1.50–1	Radius Rods	Engine Frame	Timken	Timken	34x4	35x4½	Stewart	Elliptic	Stanley

The Cars in Brief

1918 Models and their Improvements

Arranged in Alphabetical Order

CARS BY CYLINDERS

FOURS

Allen
Arbenz
Biddle
Bour-Davis
Brewster
Briscoe
Buick
Campbell
Chevrolet
Commonwealth
Crow-Elkhart
Disbrow
Dispatch
Dodge
Dort
Elcar
Empire
Fiat
Ford
F. R. P.
Geronimo
Hackett
Harroun
Harvard
Hupmobile
Inter-State
Maibohm
Maxwell
Mercer
Metz
Moline-Knight
Monroe
Moore
Nelson
Olympian
Overland
Pennsy
Phianna
Princess
Regal
Reo
Roamer
Saxon
Scripps-Booth
Seneca
Stearns
Studebaker
Stutz
Templar
Tulsa
White
Willys-Knight
Wolverine
Woods

SIXES

Abbott
American
Anderson
Apperson
Auburn
Bour-Davis
Buick
Case
Chalmers
Chandler
Columbia
Comet
Crawford
Davis
Deering Magnetic
Dorris
Elcar
Elgin
Empire
Fageol
Fergus
Franklin
Geronimo
Ghent
Glide
Grant
Haynes
Hollier
Hudson
Jones
Jordan
KisselKar
KlineKar
Lexington
Liberty
Locomobile
Madison
Maibohm
Marion-Handley
Marmon
McFarlan
Mitchell
Monitor
Moon
Nash
National
Oakland
Oldsmobile
Overland
Owen Magnetic
Paige
Pan American
Paterson
Pennsy
Pierce-Arrow
Pilot
Premier
Reo
Roamer
Saxon
Sayers
Shad-Wyck
Simplex
Singer
States
Stephens
Studebaker
Velie
Westcott
Willys
Winton

EIGHTS

Apperson
Cadillac
Chevrolet
Cole
Cunningham
Daniels
Hollier
Homer-Laughlin
Jackson
King
Murray
Oldsmobile
Scripps-Booth
Standard
Stearns
Willys-Knight
Yale

TWELVES

Austin
Hal
Haynes
KisselKar
National
Packard

Abbott

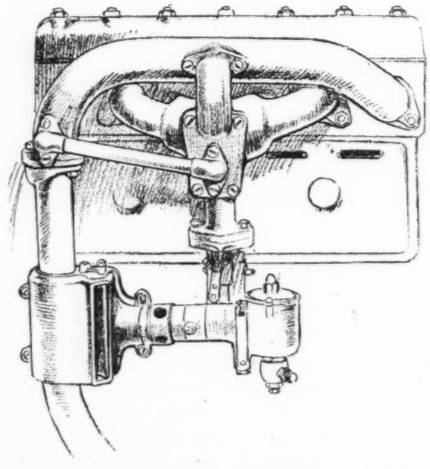
Abbott Corp., Cleveland, Ohio

THE 1918 Abbott line is new throughout. It consists of a chassis assembled from standard parts and four body types, four-passenger and seven-passenger touring, a four-passenger coupe and five-passenger sedan. All units are improved. The distributer is mounted in unit with the generator on the right side of the engine and driven off the pump shaft. All the spring eyes carry Clemmens steel bushings. The engine is a 3½ by 5¼ in. Continental six.

Allen

Allen Motor Co., Fostoria, Ohio

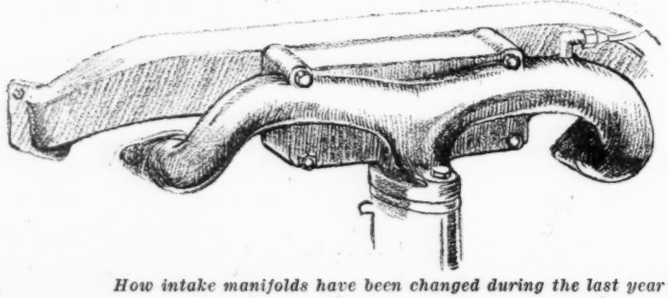
FLEXIBILITY and economy are two features that mark the engine in the Allen line for 1918, which consists of three models—a four- and five-passenger touring and a five-passenger sedan. The sedan seats five and the front seats are divided into a roomy passage way. The new Allen bodies are roomy, low-hung and better finished throughout. The upholstery covers double-deck springs which make for easy riding. The rear seat of the open cars is 49 in. wide, which gives room for three grown passengers. All electric controls and the motor-driven horn control button are in unit in the Connecticut switch mounted just below the wheel on the steering column. All are locked simultaneously by a Yale key.

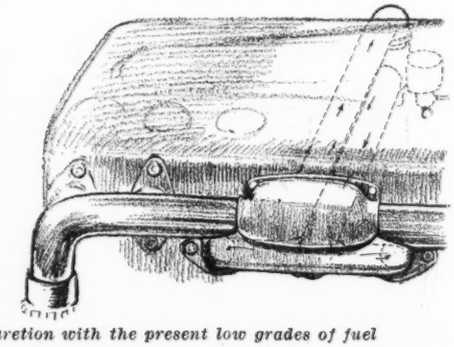


American

American Motors Corp., New York

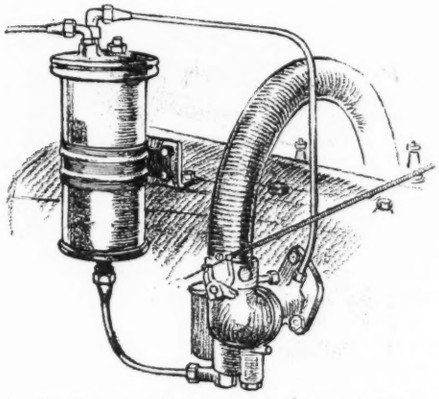
THERE have been no changes in the 1918 American six except refinement of details and installation of a new engine. The latter is a six-cylinder Rutenber 3⅛ by 5 in. The starting crank housing, which also forms the timing gear cover plate, is machined on the outside and swivels in a cast steel I-beam section cross member, and at each side of the bell housing the engine is secured to the frame by exceptionally strong brackets. There is also an oil gage on the dashboard now. The valve layout is different also, being now



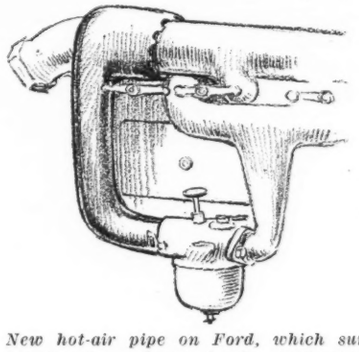


Above, Hupmobile means for preheating initial air and mixture itself. To the left, Chalmers hot spot on intake manifold, kept hot by heat from exhaust. At the right, Paige method of heating air through transverse passage in waterjacket

How intake manifolds have been changed during the last year to give better carburetion with the present low grades of fuel



Empire mounts vacuum tank on engine to eliminate vibration and get short fuel line to carbureter



New hot-air pipe on Ford, which surrounds the exhaust header and gives larger volume of heated air

on the right side. A detachable head is fitted on the engine, Hotchkiss drive has been retained. Stewart vacuum feed is fitted on the new models also.

Anderson

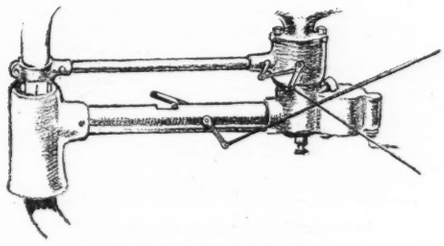
Anderson Motor Car Co., Rock Hill, S. C.

ANDERSON has made several changes in the chassis, among them being the substitution of a Zenith carbureter for the company's own make used last season. Vacuum feed also has been installed, as well as Connecticut ignition. There has been a change in the rear axle. This is now a Columbus, of the three-quarter floating type, and uses roller bearings in place of ball bearings as the previous models. The engine is a Continental, 3¼-in. bore by 4½-in. stroke. Lubrication is splash-pressure using a piston-type pump.

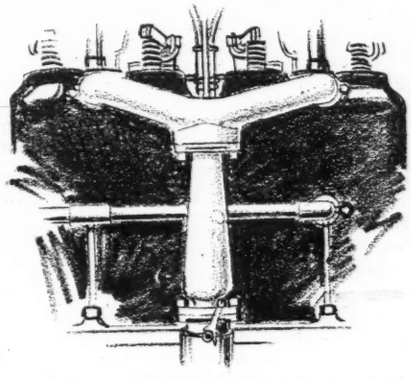
Apperson

Apperson Bros. Automobile Co., Kokomo, Ind.

MOST of the changes in the Apperson line for 1918 constitute body refinements. The company has not found it necessary to make any radical changes, as the engine and chassis are the outcome of a steady evolution since 1893. The Apperson company always has given special attention to the balance of reciprocating parts and the present crankshaft is counterbalanced. Self-lubricating bushings have been installed on the spring eyes. Hotchkiss drive is retained, with springs hung



How Nash heats the air to carbureter, showing the manually-controlled air valve for temperature variation



Intake manifold on the Reo, showing the hot-water jacket extending from it to the carbureter

under the axle on specially designed hangers arranged so they rotate about the axle.

Arbenz

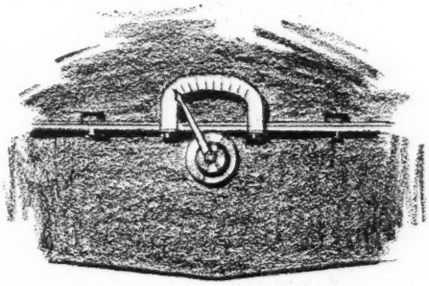
Arbenz Motor Co., Chillicothe, Ohio

ARBENZ specifications are the same for the coming season as last year's. The engine of this car is of the long stroke type. There is full cantilever spring suspension in the rear of unusual design. The Arbenz is low-priced for its size and equipment carried.

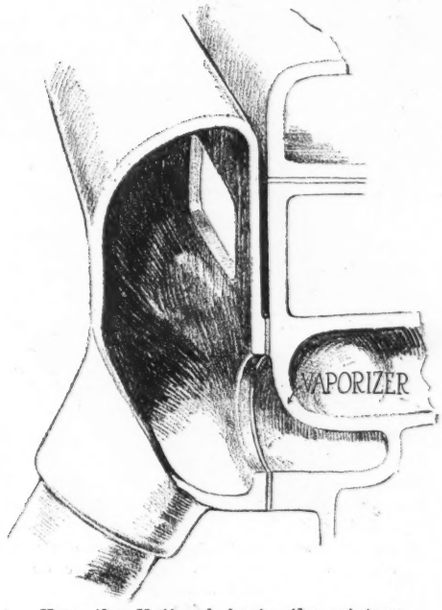
Auburn

Auburn Automobile Co., Auburn, Ind.

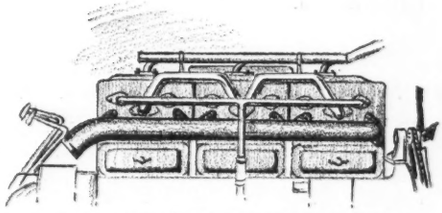
THE 1918 Auburn offering consists of two sixes, as last year, and a four. There has been no radical departure from previous practice and the new cars will come through with no great change. The principal change is in the engine size, from 3⅛ by 5 to 3¾ by 4½. The two-passenger roadster body is a continuation of the previous design, although little refinements have been made here and there. The new Auburn models 6-39 and 6-39C can be converted into all-weather cars, enabling the



Oil gage on Buick crankcase. The pointer indicates on the quadrant the amount of oil in engine base



How the National heats the mixture. The exhaust heat keeps the walls of the vaporizer hot



Winton method of arranging exhaust, water and other manifolds in methodical way on the right side of engine

owner to defy weather limitations. The contour of the top harmonizes beautifully with graceful flowing curve and distinctive body and is so fitted as practically to eliminate the detachable top appearance. In the seven-passenger six illumination of the tonneau, facilitating entrance at night, is provided by a small lamp set flush in the back of each front seat, operating automatically with the opening and closing of the door.

Austin

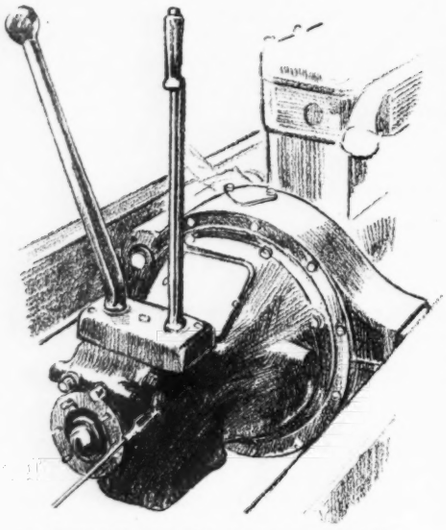
Austin Automobile Co., Grand Rapids, Mich.

THIS car has one of the longest wheelbases of American-made cars, 142 in. It retains the Weideley engine which has twelve cylinders and a piston displacement of 389 cu. in. The body lines are fashioned after the latest styles. Austin features include a two-speed rear axle, double-cantilever springs and Delco electric system.

Bell

Bell Motor Car Co., York, Pa.

THIS is a new car which made its appearance last summer. It has a 114-in. wheelbase and comes in both roadster and touring car. It uses such parts as Continental four-cylinder engine, Zenith carbureter, Covert transmission, Borg & Beck clutch and Bijur two-unit electric system. Either right- or left-hand control is offered.



Simple design of the Jones gearset, showing also the large inspection plate on clutch housing

Upholstery is in Spanish leather, and the windshield is a two-piece rain vision ventilating design.

Biddle

Biddle Motor Car Co., Philadelphia, Pa.

BIDDLE offers a line of high-priced cars in both open and closed models. The engine is a four-cylinder Buda with circulating-splash lubrication. These cars have the Gray & Davis system of starting and lighting, and ignition is taken care of by an Eisemann magneto. All models of the Biddle have a 121-in. wheelbase.

Bour-Davis

Shadbourne Bros., Frankfort, Ind.

THIS year there is a four-cylinder model of the Bour-Davis in addition to the six made last season. Both use the same chassis of a 118-in. wheelbase. The engine in each case is a Continental, but in the four the valves are in the head, while the six is an L-head type. While the chassis is the same in each model, the four uses slightly smaller tires, these being 32 by 4, while the six has 33 by 4½.

Brewster

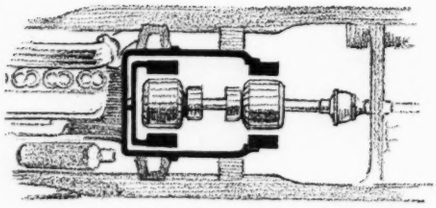
Brewster & Co., New York

CUSTOM-BUILT bodies of all types are offered by Brewster for 1918. These bodies are mounted on the same chassis which the company made last year, using a four-cylinder Knight engine with a 4-in. bore and 5½-in. stroke, Zenith carbureter, Bosch ignition and other standard parts. An interesting feature is the spring suspension of cantilevers.

Briscoe

Briscoe Motor Corp., Jackson, Mich.

BRISCOE cars are continued for 1918 without change. The car has the same high, narrow radiator that characterized it last season, and the slanting windshield



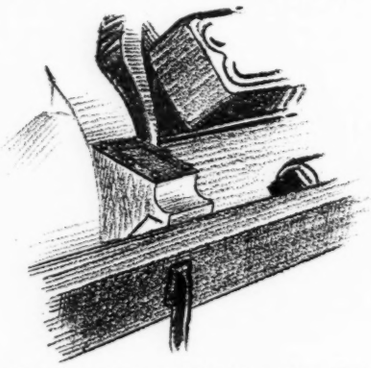
Entz magnetic transmission on the Owen-Magnetic car, which replaces the ordinary type of gearset and clutch

gives an added touch to the appearance of speed and power. The engine of the Briscoe has a comparatively long stroke, having a stroke-bore ratio somewhat larger than the average. There is also an unusual drive of the generator from off the camshaft. The cone clutch is also somewhat different from most types, being of the inverted kind. In the body is a door between the front seats, which is out of the ordinary.

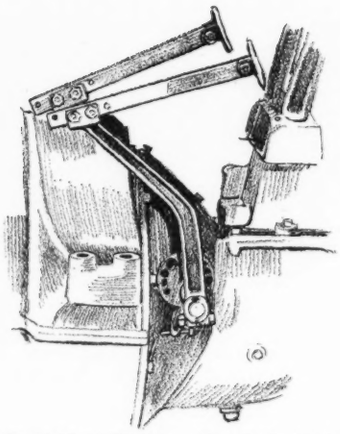
Buick

Buick Motor Car Co., Flint, Mich.

THREE chassis models comprise the Buick program. Two are sixes in which the only material difference is the wheelbase, the third is a four. The engine formerly known as the Buick Little Six is discontinued, thus simplifying production, as there are only two engine models in the line. The four chassis in most respects is the same as that of last year, known as the D-4, but has been altered somewhat in details. A gear type oil pump replaces the plunger type and is driven off the camshaft. An oil sight feed has been added to the instrument board. Improvement in the valve lifts, accelerater pedal and universal joints, together with longer control levers and springs, are chief mechanical changes. The instrument board has been narrowed, the seating arrangement made more comfortable and new features, including sloping windshield, crown fenders, etc., have been added. The larger six remains almost the same as previously, the chief refinements being in the body. The six which replaces the former Little Six is featured by its larger engine, but there are other changes toward greater comfort, such as lengthening the wheelbase 3 in. to 118; use of a dry-plate disk clutch instead of the cone; and new inclosed universals. Timken rollers replace the balls of the front wheels. Maintenance is improved by holes cut in the side



King has an accessible inspection plate on the clutch housing, which makes it easy to get at parts



Adjustable pedals on the HAL twelve, which makes it possible for persons of different height to drive comfortably

apron to facilitate removal of spring bolts and a hole in the drip pan for draining the crankcase.

Cadillac

Cadillac Motor Car Co., Detroit

ALTHOUGH there are some changes in the mechanical construction, no radical departures from Cadillac practice have taken place in the new model 57. The body line has undergone complete revision; ten body styles now are offered. The club roadster, seven-passenger convertible and coupe of last season have been dropped and a town limousine and landaulet added. Following its policies of the last three years, the company is making one chassis, which shows many refinements. Cylinder heads on the eight-cylinder engine are now detachable and the oil-filling well is on the fan shaft housing. The cooling system has been revised, with condenser for collecting evaporated alcohol in winter. Other features are better lubrication throughout and improvements in the steering. Hood and radiator are higher and there is more room in the front compartment. Shutters are provided on the hood louvres for air control. There is a tilting headlight reflector and automatic top-raising device. Interior refinements on the closed cars have been carried out to a marked degree. A notable feature is the absence of lace or braid, the binding material being the same material as the plain material.

Campbell

Campbell Motor Car Co., Kingston, N. Y.

THIS is a newcomer which made its debut last November. It has a 110-in. wheelbase, four-cylinder L-head engine and uses standard parts such as Salisbury axle, Muncie transmission, etc. The body is full streamline, roomy and the appointments thoroughly up-to-date. The Campbell four sells with complete starting and lighting, equipment, etc.

Case

J. I. Case T. M. Co., Racine, Wis.

QUITE a change has taken place in the Case line for 1918. Two cylinders have been added, 5 in. to the wheelbase,

larger tires are fitted and roomier and more modern bodies are supplied. With all, the new car is some 400 lb. lighter than the smaller 1917 model. The company no longer makes its own engines, for a Continental six replaces the old four. Cantilever springs have been replaced by underslung semi-elliptics in the rear. There are numerous refinements, such as Stewart tire-pump, anti-squeak bushings in springs, spiral bevel final drive, etc. In the body the radiator is higher and there is a straight smooth slope from it to the cowl. The whole front is flatter and at the same time more graceful. The top of the body line from cowl to rear seat is horizontal and the whole design gives a conception of speed and comfort, which is further enhanced by the decidedly sloping, folding windshield. Mahogany paneling is used in the cowl board and rear of front seat. Altogether the Case shows a decided improvement over its predecessors.

Chalmers

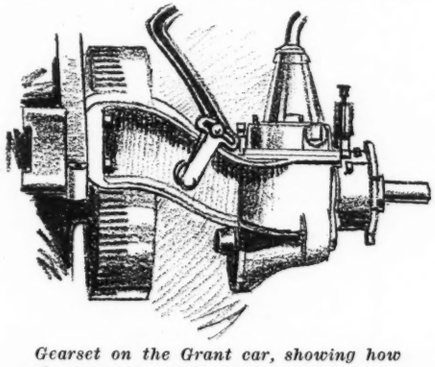
Chalmers Motor Co., Detroit

THE greatest improvement on the new Chalmers is the intake manifold which is of the ram's horn type. It is made of simple piping carried on the exterior of the engine and so formed that it carries the gas to a hot spot in the side of the exhaust manifold and thence through gradual curves to the intake valves. The elimination of sharp curves prevents deposition of raw gas and reduces friction. It is the hot spot, however, that imparts heat to the mixture. This hot spot is on top of the carbureter rise, so that the gas is forced to come into contact with it. A rounding out of lines also has taken place and now comprises ten body styles. Of these the following are open cars: seven-passenger touring; five-passenger touring; Duplex four-passenger; standard roadster; three-passenger cabriolet. The closed cars comprise a seven-passenger town car, limousine, limousine-laundaulet and seven-passenger town laundaulet.

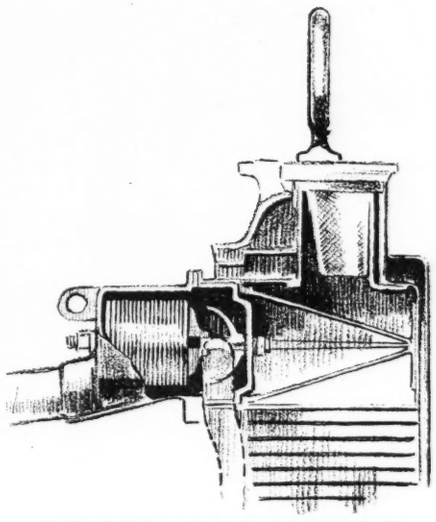
Chandler

Chandler Motor Car Co., Cleveland, Ohio

THE new Chandler car is mechanically the same as in 1917. A four-passenger sport car has been added to the line. The radiator of this car is 3 in. higher, affording a straight line from radiator to cowl. It has 32-in. wheels in place of 34 in. on the other models. The touring car and closed



Gearset on the Grant car, showing how the forward end is coupled to the engine block



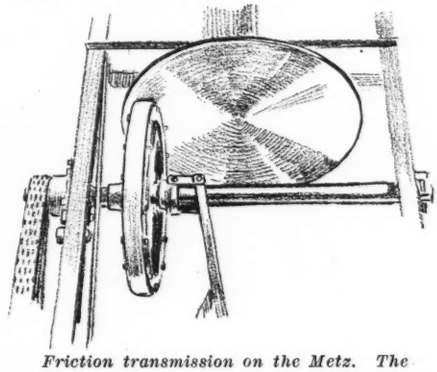
Packard thermostat, which automatically controls the amount of water flowing through the engine jackets

car interior arrangements are especially well cared for. Upholstery in the sedan and coupe is of gray whipcord, while a rich plush is used in the limousine. All inclosed bodies are Fisher-built. The auxiliary seats in the convertible sedan face forward and swing down in the backs of the front seats. All bodies are finished in Chandler blue, with black fenders, hood and wheels, except the wheels of the roadster, which are cream.

Chevrolet

Chevrolet Motor Co., Flint, Mich.

CHEVROLET as in the past has an eight- and four-cylinder, the latter in the Baby Grand touring and Royal Mail roadster models. The eight-cylinder comes in a four-passenger and five-passenger and has a valve-in-the-head engine. Both bodies are double-cowl and show much refinement. Both use the same chassis. All visible woodwork is of genuine mahogany and the metal parts from door locks to steering post are nickel. The invisible foundation of the body is built of pressed steel. The Baby Grand model has been altered in several details. There is now a sloping windshield and the control has been changed to the conventional type, that is, instead of the one pedal acting as both service and emergency brake, it now is only the service brake, the emergency being operated by a hand lever. The stroke of the engine is longer also. Thermo-syphon cooling has been replaced by pump and there is a gear-driven oil pump in place of the plunger type. Chevrolet cars now are fitted with the new Remy type of ignition. The Chevrolet roadster is continued as the Royal Mail with the above changes.



Friction transmission on the Metz. The drive to the rear axle is by chain from sprocket on countershaft

Cole

Cole Motor Car Co., Indianapolis, Ind.

THREE new streamline bodies, a seven-passenger touring, five-passenger sport model and four-passenger four-door roadster constitute the Cole line, all using the standard eight-cylinder chassis. The depth of the radiator has been increased and correspondingly the height of the hood and cowl. There is a bevel edge along the top of the body. The front seat is now solid, instead of divided and the double cowl has been eliminated. Other changes include longer hand levers, cord tires, pressed steel fenders, Pantasote top and new rear end frame construction whereby the gasoline tank is covered by a metal plate. The rear springs are somewhat flatter than formerly and equipped with shock absorbers. The engine remains essentially the same, retaining the aluminum pistons. The valve lifters have been made hollow, reducing the weight.

Columbia

Columbia Motors Co., Detroit

THE mechanical construction of the Columbia six for 1918 is identical with that of the previous season with the exception that a thermostat has been added, which makes the operation of the radiator shutters automatic.

Commonwealth

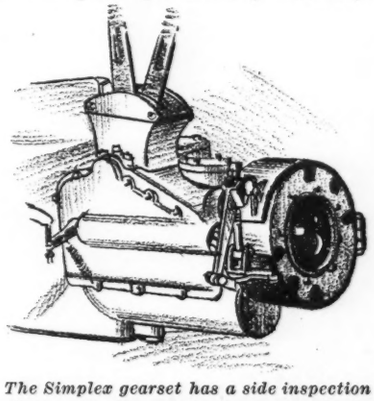
Commonwealth Motors Co., Rochelle, Ill.

THIS was formerly the Partin-Palmer. The new car is called the Commonwealth-Ultra and comes in a four-passenger chummy roadster and five-passenger touring car. Both use the same wheelbase, 112 in. The engine is a Lycoming with 3½-in. bore and 5-in. stroke. Wire wheels are optional. The purchaser has the choice of three colors. Both models have the straight-line type of body with double cowl.

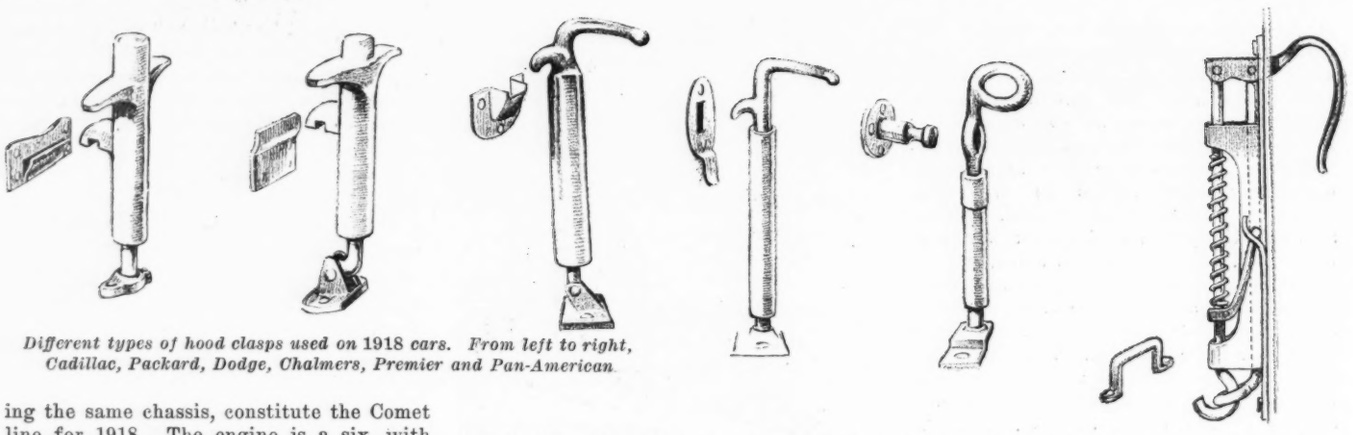
Comet

Comet Automobile Co., Decatur, Ill.

A FIVE-PASSENGER touring car and four-passenger chummy roadster, us-



The Simplex gearset has a side inspection plate. At the rear is the service brake on the driveshaft



Different types of hood clasps used on 1918 cars. From left to right, Cadillac, Packard, Dodge, Chalmers, Premier and Pan-American

ing the same chassis, constitute the Comet line for 1918. The engine is a six, with dry-plate clutch. Two universals take the drive through a hollow propeller shaft. The chassis follows standard practice throughout, with 33 by 4 in. tires. Wood wheels are regular equipment, with wire wheels optional. A one-man top is included in the equipment, with Jiffy side curtains.

Crawford

Crawford Automobile Co., Hagerstown, Md.

A FIVE-PASSENGER touring, two-passenger roadster and sedan constitute the 1918 line of Crawford cars. All are mounted on a 122½-in. wheelbase chassis powered by a 3½ by 5½-in. six-cylinder engine. The latter is a Continental fitted with Bosch magneto and Westinghouse starting and lighting. Hotchkiss drive is used, and the rear axle is a three-quarter floating Timken. Body lines are more or less conventional, with streamline effect.

Crow-Elkhart

Crow Motor Car Co., Elkhart, Ind.

MECHANICALLY the Crow-Elkhart is improved and refined over preceding models. The new line, known as series K, consists of five-passenger touring, five-passenger de luxe touring, four-passenger cloverleaf roadster, convertible coupe and convertible sedan. The greatest improvement is in body design. The regular five-passenger has a torpedo body with slanting windshield. Locating the tank under the rear gives much more room in the front compartment. Instruments are arranged better on the control board also.

Cunningham

James Cunningham Sons & Co., Rochester, N. Y.

THE Cunningham chassis, except for a few refinements, remains the same for 1918 as for the previous season. The eight-cylinder engine has the largest piston displacement of any twin engine of American made cars. A feature of these cars is the new sod pan which extends underneath the car for its entire length. The spare tires instead of being carried on the rear are now placed on the side of the car. Only the trunk rack is on the rear. The open body styles include a four-, five-, six- and seven-passenger touring and special roadster of the speedster type capable of 85 m.p.h. The closed cars are town car, landaulet and limousine. All are on a 142-in. wheelbase chassis.

Daniels Eight

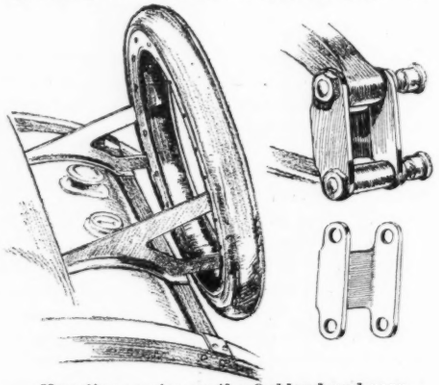
Daniels Motor Car Co., Reading, Pa.

A FIVE-PASSENGER, close-coupled, collapsible sedan is a new body of unusual design which has been added to the Daniels line for the coming season. The one chassis remains practically the same as last year's. Some fine custom-built bodies were produced last season to meet the demand for special bodies, and this policy will be continued this year.

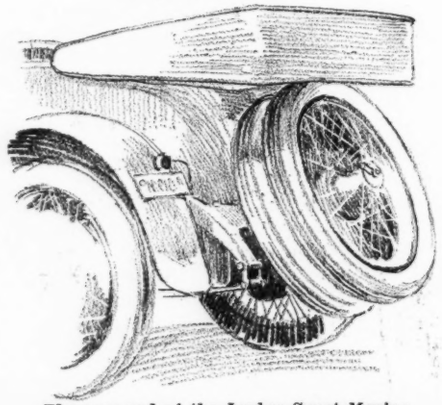
Davis

George W. Davis Motor Car Co., Richmond, Va.

THE new Davis is mechanically the same for 1918 as it was in 1917. In fact, the chassis has not been changed materially for several seasons, the only change last year consisting of refining the body lines, especially the shape of the hood.



New tire carrier on the Oakland and rear spring link arrangement, which affords a one-piece construction



The rear end of the Jordan Sport Marine is so arranged that two wire wheels can be carried conveniently

Deering-Magnetic

Magnetic Motors Corp., Chicago

THIS year marks the entry of another magnetic car, the Deering-Magnetic. This car uses a Dorris chassis and engine to which has been fitted the Entz magnetic transmission. The engine is a six with cylinders 4 by 5 in. Tires are 33 by 5 in. and the wheelbase 132 in. Standard parts such as Timken axles, Rudge-Whitworth construction. The finest coach designing is manifest in the body of this newcomer and the design is such that the same radiator and hood is used in the touring, sedan and coupe without in any way interfering with the appearance. The bevel-edge idea has been carried out all the way through, not only on the body, but fenders and running boards as well.

Disbrow

Disbrow Motors Corp., Cleveland, Ohio

THE Louis Disbrow Special is a car for those who want extreme speed and yet not an out-and-out racing car. Standard units such as Warner steering gear, transmission, clutch, Wisconsin engine, Perfex radiator, Houk wheels, etc., are used in its makeup. The body, while racy, is molded gracefully from radiator to rear, with two bucket seats. Fenders are provided, but these cover the wheels only. There are no running boards.

Doble

Doble-Detroit Co., Detroit

THE seven-passenger touring and three-passenger roadster of the Doble steam car are mounted on a chassis with a 135-in. wheelbase. The engine of the Doble is double-acting and develops 75 hp. A feature of this car is a burner which permits the use of kerosene both in starting and running. The final drive is by spur gear to an American rear axle. The rear springs are semi-elliptic and the wheels 35 by 5 in.

Dodge Brothers

Dodge Brothers, Detroit

THERE are many detailed changes and improvements in the Dodge Brothers

car, not only to decrease weight but also to improve the finish and general appearance. The pistons have been decreased in weight by more elaborate foundry equipment. The greatest improvement has been along the line of increased convenience to the occupants and increased ease of manual control for the driver. Controls such as the accelerater pedal, spark and throttle on steering column, etc., have been altered slightly so that they are more accessible to the driver. One of the features of this car is the finish, which is baked on, making it very durable and lasting. There is also less wood used in the body structure than with most cars necessitated by the high temperatures to which the body is exposed when the enamel is baked on in the ovens.

Dorris

Dorris Motor Car Co., St. Louis, Mo.

THE characteristics of the Dorris six-cylinder engine are retained for 1918, although the wheelbase of the car has been increased 2 in. to 130 in. Aside from the sturdy design, the Dorris engine has many refinements, such as a provision of oiling the overhead rocker-arm bearings of the valve action, from the oil pressure pump. Another refinement consists of running the breather tube up to the inclosed overhead valve compartment, utilizing what oil vapor is given off for a valve lubricant instead of allowing it to spray over the exterior of the engine. Dorris bodies are very roomy and completely appointed to the most minor details. The Dorris uses large tires, being 36 by 4½ in.

Dort

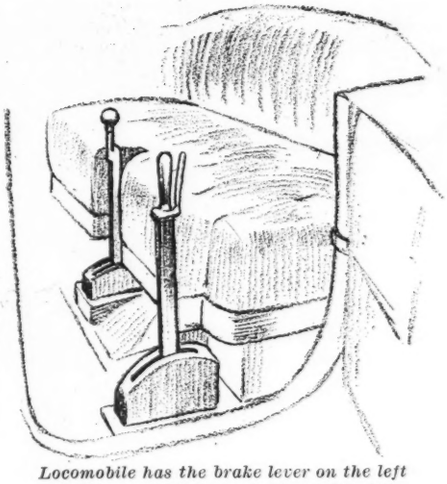
Dort Motor Car Co., Flint, Mich.

DORT has added a sedan to its line, which is permanently inclosed. The car is of flat roof design, and the belt line is practically flat with a small up-turn at the rear end. Seating arrangement is conventional sedan style, with divided front seat. In addition there is a sedanet, with removable panels, affording a convertible type body. Both use the model 9 Dort chassis, which is the same as in 1917.

Elcar

Elkhart Carriage & Motor Car Co., Elkhart, Ind.

ELCAR has added a six to its line for 1918, which in addition to the newcomer includes a five-passenger touring of improved design, four-passenger roadster with small doors for the rear compartment and a five-passenger sedan. These bodies fit either the four- or six-cylinder chassis, because the frame is the same in each case. Detailed improvements include a longer radiator core, heavier frame, better tank support and tire carrier and Timken bearings for all wheels. The front springs are 2 in. wide now and Hotchkiss drive has been adopted for both models. There are many refinements in the engine also.



Locomobile has the brake lever on the left and the gearshift lever on the right of the driver

Elgin

Elgin Motor Car Corp., Chicago

ELGIN has added a convertible sedan to its line for 1918, so that it now comprises three models. The new body fits the standard Elgin chassis of 117-in. wheelbase. Front seats are of the bucket type. The ceiling is covered with the same material as the seats and door interior. Among other features is a heater. Finish is black with a silver stripe.

Ball end of the Marmon gear lever, showing the Yale key which locks the transmission

Empire

Empire Automobile Co., Indianapolis, Ind.

Empire fours and sixes are continued with little change. Model 71, introduced about the middle of last year, is a six fitted with a high, narrow racing-type radiator, sloping hood, deep front cowl and divided front seats. The chassis of this is practically the same as that of the touring car, using a Continental engine. The Teetor-Hartley engine is continued with minor modifications in the four.

Fageol

Fageol Motors Co., Oakland, Cal.

OUTSIDE of a few refinements the Fageol will be produced this year in identically the same model as last. Aside from its very original lines and luxurious finish and equipment, its chief feature is the engine, a Hall-Scott aviation engine, having six cylinders of 4-in. bore and 5-in. stroke. This car has a peculiarly-shaped radiator and the hood is fitted with a series of ventilators on top which give the car a very unusual look.

Fiat

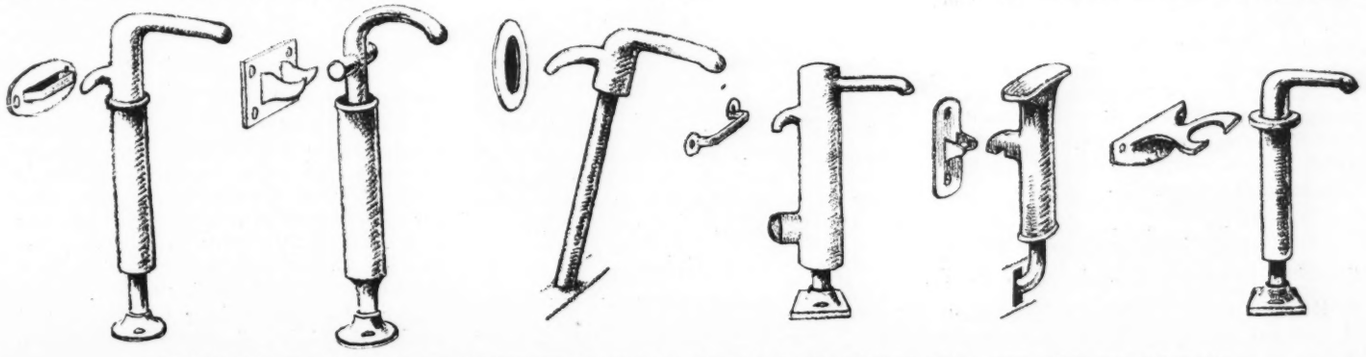
F. I. A. T. Co., Poughkeepsie, N. Y.

FOR 1918 the Fiat will appear in exactly the same model as in 1917, with no change mechanically or in body. The company does not deem it advisable to make any changes. The Fiat always has been characterized by its great power and distinctly Italian design, the body being very deep with high hood and radiator, the latter so shaped that it immediately establishes the identity of the car. Some of the Fiat parts are made in this country, while others are turned out in the factory at Turin, Italy.

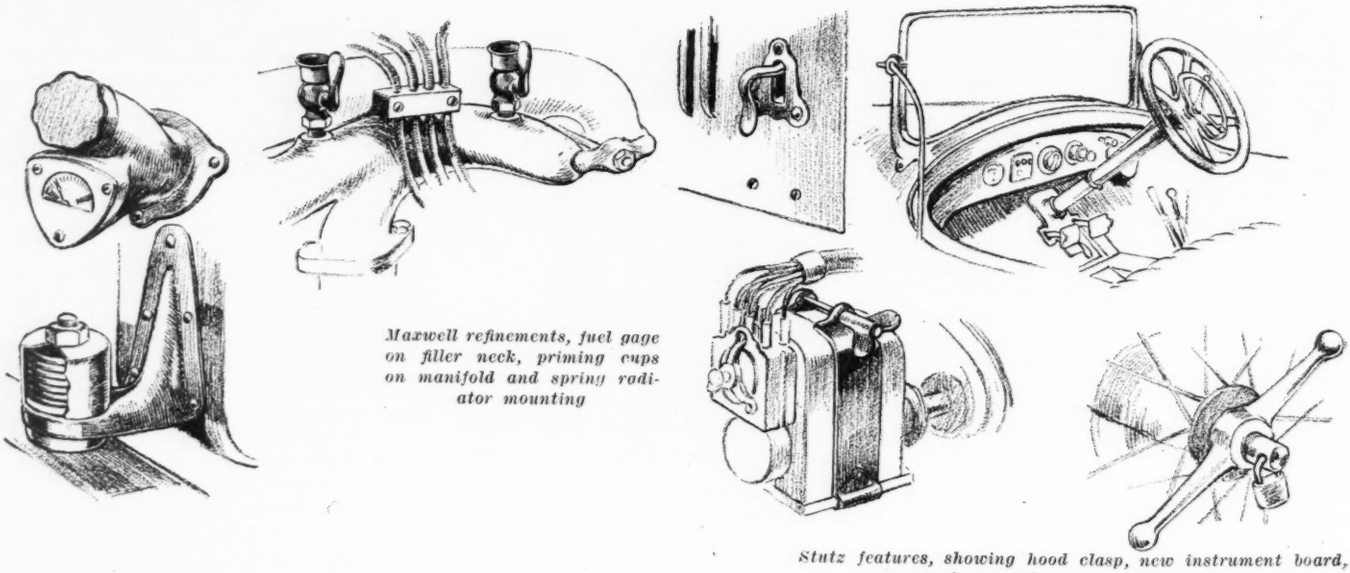
Ford

Ford Motor Co., Detroit

FORD cars will come through for 1918 with little or no changes of real consequence in the chassis or engine. A slight change has been made in the carburetion, in that a larger hot-air pipe is used for quicker and greater vaporization of fuel. This means economy in fuel and tends to eliminate any difficulty in starting. Another slight change consists of a pressed-

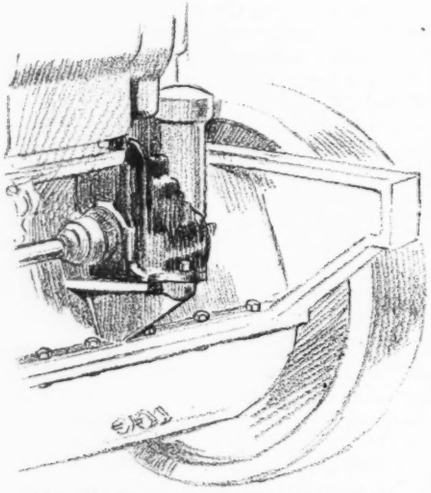


Additional types of hood clasps, reading from left to right, Auburn, Davis, Mitchell, Paige, Locomobile and Oldsmobile



Maxwell refinements, fuel gage on filler neck, priming cups on manifold and spring radiator mounting

Stutz features, showing hood clasp, new instrument board, magneto mounting and spare wheel lock



The magneto on the White is mounted at the front of the engine, in an accessible position

steel timer shell in place of the cast type. The top has also been changed somewhat, in that the bows are of a different construction. A feature that will appeal to many Ford owners is the elimination of the lid on the rear seat. The cushion now acts as a cover for the compartment with a small strip of wood extending lengthwise with the seat for a brace. To get into the compartment it is only necessary to raise the cushion slightly. The chassis layout is the same as before; in fact, the model T has not been radically changed since 1909. Last season a higher radiator and hood were fitted and these are retained unchanged this year. The Ford car is the only car made in this country which uses a planetary form of transmission, in which the gears are always in mesh. Another Ford feature is the flywheel magneto, which not only supplies current for ignition, but lighting as well.

Franklin

Franklin Automobile Co., Syracuse, N. Y.

THE new series 9 Franklin incorporates several changes. There has been a change in the rear axle reduction, so that the open cars have quite a little more ability. The Willard battery now permits the starter to crank the engine for a longer period and there will be less drop of voltage in cold weather. A new design slip joint between the engine and transmission has been put in and a primer built into the carbureter, consisting of an electric-heating coil controlled from the dash. The clearance of the aluminum pistons has been changed slightly to reduce oil consumption and eliminate piston noises. Lubrication of chassis parts has been refined throughout, doing away with grease cups in several instances. Of course the air-cooled engine, full-elliptic springs, and wood frame are found in the new series.

F. R. P.

Finley Robertson Porter Co., Inc., Port Jefferson, L. I., N. Y.

THE model 45 F. R. P. except for a change in the clutch remains about the same for 1918. The company now uses a Merchant & Evans clutch, which is of the disk type. The sixteen-valve engine is retained, as well as the general features of the chassis, which is exceptionally well built. The engine is very powerful and has a bore and stroke of 4⅜ by 6¾ in.

Ghent

Ghent Motor Co., Ottawa, Ill.

THE principal change in the Ghent is from a four- to a six-cylinder car and the wheelbase from 120 to 125 in. The engine is a Continental 3½ by 5¼, driving through a Borg & Beck clutch. The general construction is conventional throughout, using such standard parts as Auto-Lite starting and lighting, Connecticut ignition and Stromberg carbureter. The lines of the body are distinctive and wood wheels are standard, with wire optional. Body styles include five-passenger sedan and touring.

Glide

Bartholomew Co., Peoria, Ill.

THE chassis of the 1918 Glide is practically the same as last year's, with the exception of refinements. It has been lowered 1½ in. by a new frame design which does not affect the road clearance. Body lines are more graceful, which with the lower chassis has added greatly to the looks. Other improvements include a slanting windshield and a new one-man top with Jiffy curtains. Bodies are five-passenger touring and four-passenger roadster. Colors this year are meteor blue for body; hood, fenders and gear, black; and wheels, white.

Grant

Grant Motor Car Corp., Cleveland, Ohio

THE greatest improvements in the 1918 Grant consist of better finish, trimmings, etc. The actual mechanical changes have not been radical, although the looks of the engine are entirely changed. Special attention has been given to piston design to take care of distortion. Better springing is in evidence and a long third member takes torque and reaction. The engine lubrication has been completely redesigned and the breather tube put in a more accessible position. The appearance of the touring car and roadster has been enhanced by a new radiator which is 1 in. higher than the old one and of a more modern type. The lengthening of the wheelbase and use of slanting windshield have improved the looks of the cars. Particular care has been paid to the top design.

Hackett

Hackett Motor Car Co., Jackson, Mich.

THE 1918 product of this company consists of a new two-passenger roadster, five-passenger touring and five-passenger all-season car. The top on the latter is made of wood, beautifully finished. This car can be purchased with or without the all-season top, which is detachable. The tire size has been increased from 31 by 4 to 32 by 3½. The company makes its own engine which has a bore of 3¾ in. and stroke of 4½ in. A neat bevel edge extends around the entire body.

HAL

The Hal Motor Car Co., Cleveland, Ohio

THE 1918 HAL twelve has thermostatic control of the water system. The construction of the powerplant and chassis remains practically the same, although there is a heavy tie rod between the front end of the springs to minimize vibration in the front of the car. Slight changes also have been made in the clutch mechanism bushings on the brake counter shaft. No change has been made in the carburetion to take care of the present day fuel for the design and construction of the engine is such that this was taken care of in the original HAL design. The bodies are in accordance with the dictates of the purchasers to a great extent and thus become practically custom-built jobs.

Harroun

Harroun Motors Corp., Wayne, Mich.

HARROUN body dimensions are out of the ordinary for cars in its price class. For instance, there is 49 in. of space between the upholstery of the rear seat, which is unusual for a light car with a short wheelbase. The assembly of the running board, braces, muffler, with brackets, and battery with brackets are all one assembly and can be taken off or put on by six bolts. The rear spring suspension is unusual in that the springs are hung inside the frame. One of the chief features of the Harroun is the flexible steering wheel, which has a spider of spring steel which eliminates strain on the driver's wrists. The general simplicity of design is apparent in this car also.

Harvard

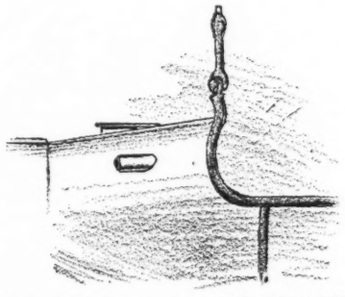
Harvard-Pioneer Motor Car Corp., Hudson Falls, N. Y.

HARVARD has two cars for 1918, one a two-passenger roadster, the other a four-passenger cloverleaf model. Both use the same chassis and most of the parts are interchangeable. The radiator on the new car is streamline type 22 in. high. Pleated upholstery has been substituted for the conventional tufted kind used last season.

Haynes

Haynes Automobile Co., Kokomo, Ind.

NEW streamline bodies feature the Haynes for 1918, which is continuing the six-and twelve-cylinder chassis offered last year with but few mechanical changes, including the adoption of Bendix drive for starting motor and a slight change in the method of spring suspension. The five- and seven-passenger cars have wheelbases of respectively 121 and 127 in. either of which can be obtained with the six- or twelve-cylinder engine. One new body type, a four-passenger, four-door roadster without divided front seats, has been added to the line.



Miniature lamps are on each side of the cowl of the Fiat, with a window-ventilator on top

Hollier

Lewis Spring & Axle Co., Chelsea, Mich.

HOLLIER offers a new six for the coming season, called model 206. On model 188, the eight-cylinder, there are very few changes, consisting mostly of refinements, such as nickel molding on the top, integral gypsy curtains, pleated upholstery, etc. The new six has a larger engine than last year, the bore being 3¼ in. and the stroke 4½ in. It is a Continental. The frame and axles are the same as used last year, but the car is 2 in. lower due to redesigned cantilever springs. The steering gear is worm and gear type, with polished aluminum spider and corrugated walnut rim. Horn button, carbureter adjustment and ignition switch have been placed under the steering wheel, making a less crowded instrument board. The body is 5 in. longer than before and has divided front seats. The windshield is slanted 18 deg., and with the low cut body gives the car a racy appearance. The front is similar in appearance to the Rolls-Royce.

Homer-Laughlin

Engineer's Corp., Los Angeles, Cal.

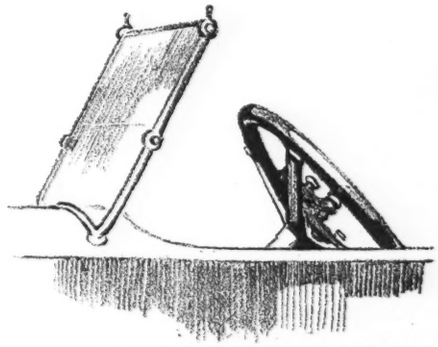
THIS is an eight-cylinder car made in roadster type. It has a 112-in. wheelbase and is fitted with friction transmission. Wire wheels 30 by 3½ in. are standard equipment. Final drive is by chain and the rear axle is, of course, dead, with this type of drive. The rear springs are cantilevers and ball-bearings are used on the front wheels, rear axle and gearset.

Hudson

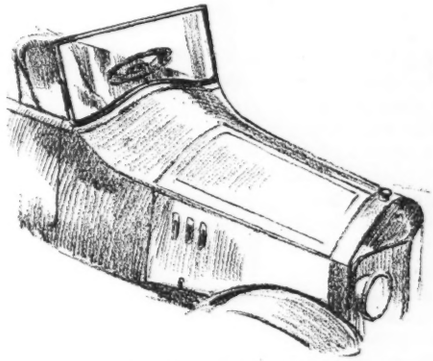
Hudson Motor Car Co., Detroit

NO change in specifications are in evidence on the new Hudsons. There are several refinements. One of these is a thermo-syphon control of the water circulation. This does not control the shutter, which is still hand-operated, but maintains the water at a proper temperature in conjunction with the shutter. There is a newly shaped air intake and a plate which closes the louvres in the bonnet so that when the front shutters are operated the carbureter is in an inclosed compartment which supplies air of the necessary warmth. There is more room in the body of the touring car, the windshield supports are more rigid, the door locks better and the cowl is rounded slightly. Care has been

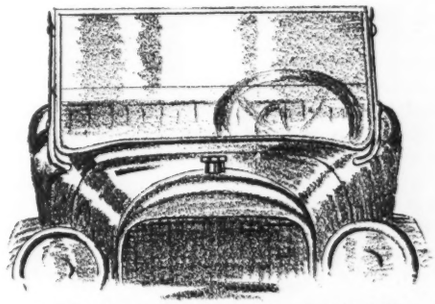
The Liberty has a high radiator, protected from mud and water by splash plates on the frame ends



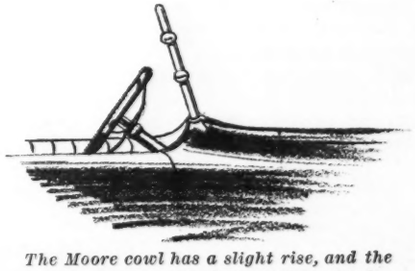
The upper edge of the Hackett body is beveled and the windshield has a very pronounced slope



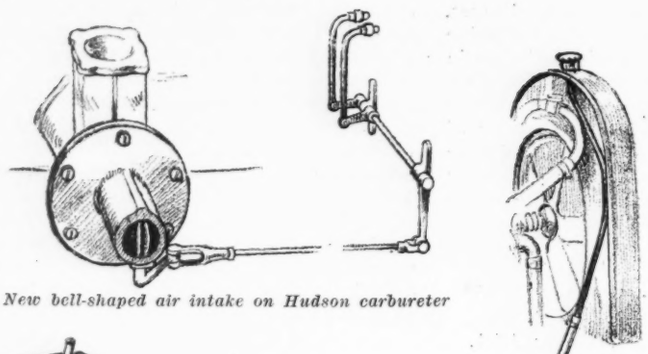
View of the Crow-Elkhart showing the windshield construction in keeping with the V-type radiator



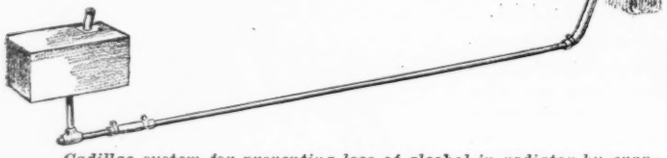
Front view of the Columbia showing how the top sides tumble home and the design of the windshield



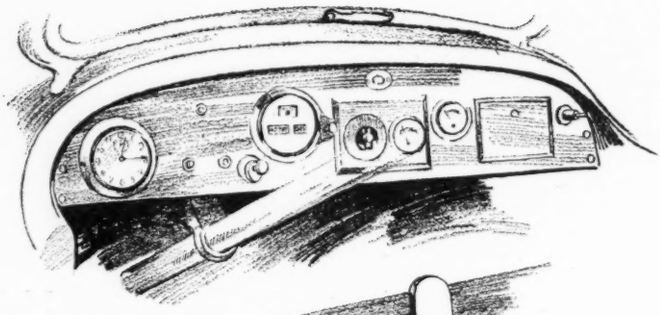
The Moore cowl has a slight rise, and the wheel close to the dash makes steering rigid

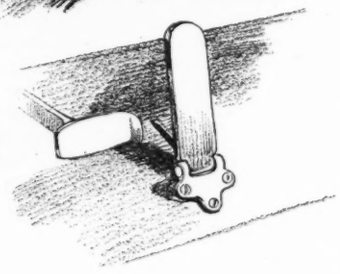


New bell-shaped air intake on Hudson carbureter



Cadillac system for preventing loss of alcohol in radiator by evaporation. The alcohol is condensed in the small tank





Instrument board on the Flyer model of the Jackson, showing also the novel form of accelerater pedal

taken to make the car rattleproof. Spring hangers and shackles now are made adjustable for wear. The color has been changed to a slightly lighter blue, and a white stripe is carried around the molding, on the louvres and frame ends.

Hupmobile

Hupp Motor Car Co., Detroit

HUPP has made a radical change and brought out an entirely new car, the series R, which supersedes the series N. The new Hupp is a four-cylinder car, lower in price and smaller in the point of wheelbase, but from the point of room has as much as the five-passenger of last year, due to a shorter engine and elimination of the cowl tank. The wheelbase has been decreased 7 in. to 112 in. A five-passenger touring and roadster are supplied in the series. Many of the features are new to Hupmobile practice, and there are those which exemplify the trends in engineering development to take care of low-grade fuel. A complete hot-air arrangement constitutes one of the refinements. There is also an entirely new pressure-feed oiling system. Another Hupp departure is the detachable engine head. Body lines are better throughout; the windshield sloping and upholstery are in French pleats. The entire body is lined. The body is blue, of a somewhat lighter color than that of last year. The curtains are Bishop style, opening with the doors and folding into the top when not used.

Interstate

Inter-State Motor Co., Muncie, Ind.

THE most important change in the Interstate for the 1918 season consists of a Beaver engine model, 3½ by 5 in., which is the same size as the company's own make of engine used last season. The new engine is I-head construction in place of the L-head previously used. Otherwise the car remains about the same. Wire or wood wheels are optional with the purchaser.

Jackson

Jackson Automobile Co., Jackson, Mich.

SIX body styles on one 118-in. chassis make up the Jackson eight line for 1918. Mechanically the chassis remains the same. The leader in the line is the Flyer model, a low racy type offered in four colors, including the standard blue with black band and white stripe. There is a sudden drop from the cowl to side in this model, which with the straight line to the back gives the car distinction. The five- and seven-passenger cars are somewhat similar in appearance, the former having more conservative lines. A special equipment of the Flyer model includes an eight-day clock, Moto-Meter, tonneau light and cigar lighter.

Jones

Jones Motor Car Co., Wichita, Kan.

EXCEPT for improvements in refinements, the Jones six is unchanged. Following its policy set a year ago, the company is making one style of chassis. The body lines for 1918 have undergone no particular change. The front seats of the roadster are divided by a wide aisle, while the upholstery is machine-buffed black leather.

Jordan

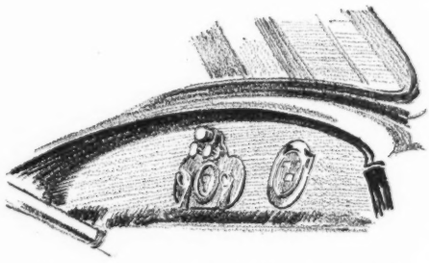
Jordan Motor Car Co., Cleveland, Ohio

FOUR new closed type of bodies, a sport limousine, sedan, town car, and brougham have been added to the Jordan line, beside a Sport-Marine open body, which altogether now comprises seven body styles. All use the same chassis, which is identical with that of last season, except for a new Continental engine. Individuality of body and color, tending to give the car a custom rather than stock look, is one of the notable features of Jordan cars. Many color options are offered to suit any taste. The seven-passenger sport limousine has an all-aluminum body and is, therefore, light.

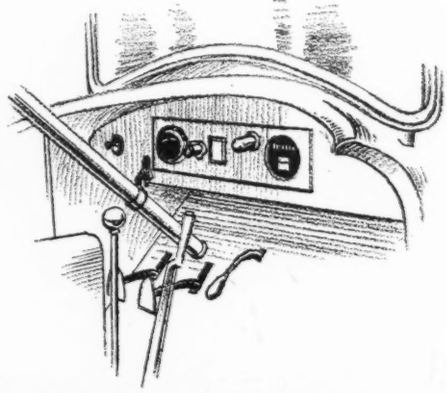
King

King Motor Car Co., Detroit

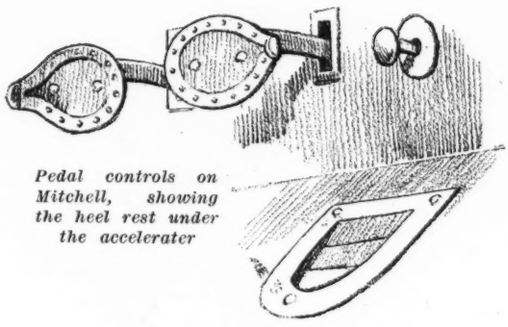
FEW changes are incorporated in King cars for 1918. The previous model has been refined to the extent of stiffening the rear structure of the chassis in the vicinity of the tire support. A cross member has been added behind the transmission and channel brackets at the rear cross members. Other than this the car is the same as model E17, retaining such features as the eight-cylinder engine, Stewart vacuum feed and little conveniences of detail which contribute to the comfort of the occupants. The body styles include a seven-passenger touring, touring-sedan, four-passenger and three-passenger roadster. The seats in the Foursome are lower than in the other models and the design gives a low, racy appearance. The windshield on this model also is tilted, while on the others it is straight. All the King bodies are made with the top sides sloping inward, and the rear deck of the roadster contains a large carrying compartment.



Clean design of the Hollier instrument board, which carries only the speedometer besides the switches



Interior view of the Elgin driving compartment, showing the disposition of the various units on the dash



Pedal controls on Mitchell, showing the heel rest under the accelerater

KisselKar

Kissel Motor Car Co., Hartford, Wis.

AN innovation for the KisselKar, that of a detachable all-year top, in which all the windows but the rear one can be lowered or raised, made its appearance in the new four- and five-passenger staggered-door models announced last fall. The four-passenger model is a small sedan which, without the top, is a sport or club model, or four-passenger roadster. The new summer top is of a semi-Victoria style and has an individuality that should attract the eyes of purchasers who are looking for distinction. The five-passenger model, the sedan, differs from the regular sedan in that there are two doors instead of three. It also has the all-year top. This body is mounted on the six-cylinder chassis only, while the four-passenger model can be obtained on either the six or double-six, the new twelve announced last year. The two new models are in addition to the regular line of standard open and regular all-year bodies.

Kline-Kar

Kline Car Corp., Richmond, Va.

SEVERAL improvements in the way of chassis refinements have been carried out on the Kline-Kar. For one thing, the intake manifold has been eliminated entirely and the carbureter bolted directly to the cylinder block. The valves also have been moved closer to the bore of the cylinders, affording less offset between the latter and valve chamber. Reciprocating parts are lighter and the engine speed has been increased 200 r.p.m. Lubrication is better also. Other improvements consist of a higher and more efficient radiator, better braking system and improvement in springing.

Lexington

Lexington Motor Co., Connersville, Ind.

THE Brush type of frame design, in which the running boards are incorporated as part of the frame members, is a feature on the new series of Minute-Man sixes. The wheelbase has been increased 6 in. to 122 in. Tires likewise have been increased, 34 by 4 replacing the 32 by 4. The emergency brake operates on the transmission shaft. A new radiator design is used and the front end of the car is housed in a new splash plate. The Moore multiple-exhaust system is retained, and the crankshaft now has inherent balance. A new streamline five-passenger body has been added, with submerged seats. The latter disappear completely within the tonneau floor boards when not in use. The spotlight is mounted permanently on the windshield bracket. Another new feature is a distinctive design of tire rack on the rear. This is a dummy hub with three wood spokes and the regular Goodrich felloe. There are only four oil cups and two grease cups, oilless bushings taking care of other parts.

Liberty

Liberty Motor Car Co., Detroit

A NEW sedan, distinctively Liberty throughout, with the same straight lines and trim appearance that have marked the company's products from the start, has been added to the line. The body is mounted on the same chassis of 115-in. wheelbase as the other bodies, the chassis being continued with only a few minor changes, chief of which is an aluminum crankcase. Upholstery has been changed to the straight pleated type. The lamps are also larger. The front seat on the roadster is adjustable. Other improvements include a lower front license bracket, metal binding instead of cloth on the top bows and haircloth carpets. Besides the sedan there are five other bodies.

Locomobile

Locomobile Co. of America, Bridgeport, Conn.

THE Locomobile chassis has been refined by a new design of clutch, giving more smoothness of action, and improving the engine by the use of the Berling tandem ignition system, by reducing the weight of the reciprocating parts and also by adopting the Lanchester crankshaft vibration damper. The increase in engine speed has necessitated a reduction in gear ratio, resulting in increased car activity. The bodies for both the 38 and 48 are continued for the present season without change.

Madison

Madison Motor Corp., Anderson, Ind.

PRACTICALLY no changes are in evidence on the 1918 Madison so far as the chassis is concerned. Refinements in the lines and details of the body constitute the chief improvements.

Maibohm

Maibohm Motors Co., Racine, Wis.

THE Maibohm has the same smart and distinctive lines that characterized it last year. The sport roadster, which can show quite a turn of speed, is a low-built car with very comfortable upholstery, so that the passenger sits within the body despite its rakish exterior. The pedals are adjustable to make driving comfortable for different individuals and the levers are bent so they can be reached easily.

Marmon

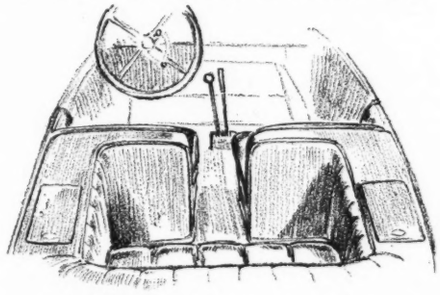
Nordyke & Marmon Co., Indianapolis, Ind.

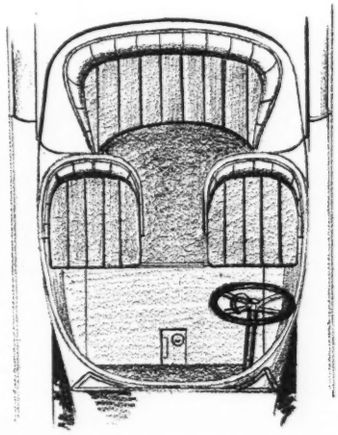
NUMEROUS refinements are found on the new series Marmon, which like its predecessor is called the 34. Important features such as aluminum engine, special frame and running board construction, graduated rear cross springs, etc., are retained. The division between the front seat has been eliminated, a plain double seat being used. Body lines have been changed a little here and there and the windshield sloped. Change in the engine design has done away with the sheet metal side plates. The Bijur electric system has been installed and a Bosch magneto is used for ignition. Other small changes include a plain bearing fan shaft, magnetic tank gage, one key for the switch, gear lever and tool box lock and glass window in top. Naturally prices are higher. For those who want special bodies, the Marmon company offers the chassis alone.

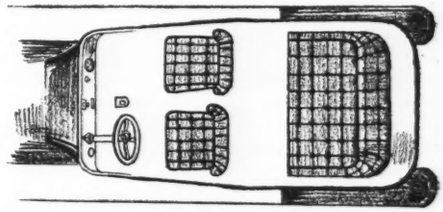
Maxwell

Maxwell Motor Co., Detroit

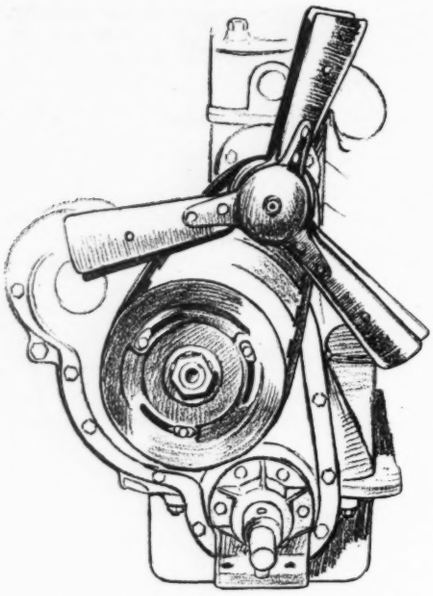
THE 1918 Maxwell abounds in refinements. In the first place the car has a 6-in. longer wheelbase and is fitted with a 50-in. underslung compensating rear spring. The body is fashioned after the Marmon type, with front door hinged at the back instead of forward. Other changes consist of a sloping windshield, Atwater Kent ignition, pleated upholstery, starter lock—the car cannot be started



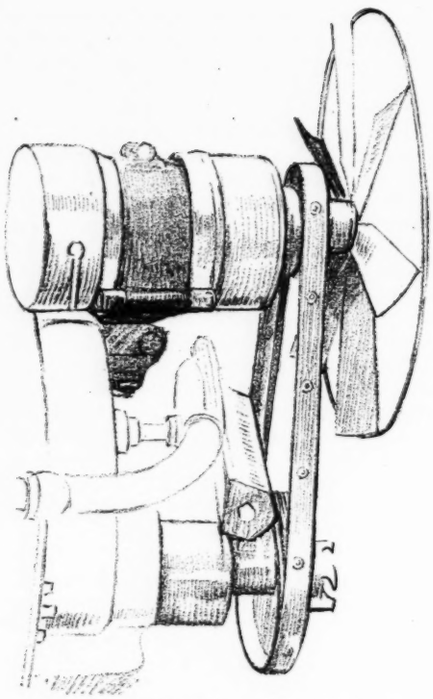




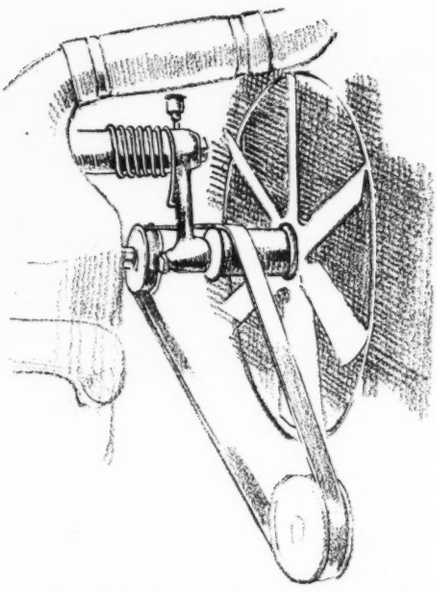
Prevalent styles in the center aisle construction of some four-passenger sport models. On the left is the Chandler, showing compartments on each side. Center, birdseye view of the Pilot seating arrangement, and, right, the Dort, showing individual front seats



Oakland fan adjustment. Bringing the V-pulley flanges together by three screws tightens the belt



Mounting of Cole generator, driven by the same belt that drives the fan, making for simplicity



The Maxwell fan driving mechanism, which has a spring arrangement for keeping the belt tension uniform

without pressing the button of this lock—one-piece crown fender, gage on gas filler, running board without apron, 6-in. frame and extra wheel on the rear. In addition there is the touring car and roadster with an all-weather top, sedan, berline and coupe. The berline is similar externally to the sedan but carries six passengers. The driver's seat is shut off by a glass partition. The company has held fast to its one chassis and there have been no fundamental changes in this mechanically. The body now rests directly on the frame instead of on projecting side pieces.

McFarlan

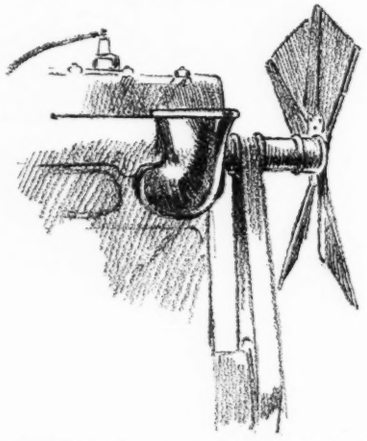
McFarlan Motors Co., Connersville, Ind.

THIS company specializes in out-of-the-ordinary body construction, covering everything from the touring roadster to the Victoria touring in open cars and from the large berline to the speeding sedan in closed cars. In all there are thirteen models, a two-passenger roadster, four-passenger roadster, four-, five-, six- and seven-passenger touring, a town car, seven-passenger cabriolet, two sedans, one with a sloping V front, the other a straight front, berline, limousine and landaulet. There are no changes in the chassis. The Teetor six engine is retained as well as the low cradle rear spring suspension.

Mercer

Mercer Automobile Co., Trenton, N. J.

MERCER cars look practically the same as last season. The same long, low and thoroughly harmonious lines of the body are retained. The 22-73 series, as the new line is designated, comprises the touring, sporting, runabout, raceabout and touring limousine. Accessibility stands out all over the powerplant of this car, and it is a pleasure to lift the hood and view the clean exterior of the engine, which needless to say is very fast.



Oil filler pipe on Briscoe, which is placed high on the engine to make it accessible

Metz

Metz Co., Waltham, Mass.

THE chief characteristic of the Metz is, of course, its friction transmission, which the company has used since the car's inception. There have been several refinements in the chassis, but essentially the car remains the same for 1918. The camshaft is now driven by helical cut gears in place of the spur type. Atwater-Kent ignition has been substituted for high-tension magneto. The gasoline is fed by gravity to the carbureter in place of vacuum feed. The friction form of transmission is retained without material change.

Mitchell

Mitchell Motors Co., Racine, Wis.

MITCHELL enters the 1918 season with a continuation of its model D-40 and C-42 and offers both in many styles of open and closed bodies. The latter ranges from a three-passenger runabout to the town car. The company makes its own engine, which is a six, of 3¼-in. bore and 5-in. stroke in the D-40 and 3½ by 5 in. in the C-42. The axle also in the former is three-quarter floating, while that of the C-42 is full-floating. So far as body lines are concerned, the same streamline types are found in the latest models. In fact, Mitchell cars have always been featured with high radiator and straightline bodies.

Moline-Knight

Moline Automobile Co., Moline, Ill.

AS a general thing the Moline-Knight is continued for 1918 without change, except for a few refinements in the chassis. Self-lubricating bushings now are fitted in all the spring eyes of the spring shackles and the front springs have been increased in width from 1¾ to 2 in. The sides of the body are quite deep on all Moline-Knight models, made possible by the use of the Brush type frame, which lowers the body considerably. This also allows the seats to be placed lower, but the car has as much ground clearance as the average. The V-shaped radiator is retained unchanged.

Monroe

Monroe Motor Car Co., Pontiac, Mich.

A FIVE-PASSENGER touring and two-passenger roadster constitute the 1918 Monroe offering. Everything about the cars is in line with the latest tendencies. The overhead valve engine, detachable cylinder head, large valves, dry-plate clutch, slanting windshield and cantilever springs are exemplifications of this. The touring car is roomy, having a 115-in. wheelbase, and embraces the latest in construction ideas, especially in the frame which is deep-section with mud aprons and running boards integral.

Moon

Moon Motor Car Co., St. Louis, Mo.

THE latest feature in Moon cars is the addition of a light six. Like its bigger brothers the newcomer is made in touring and roadster types. The radiator is somewhat higher, and there is a straight line slope from it to the dash, whereas last season's models had a slight break in this line at the juncture of body and hood. The bodies of all Moon models are high-cowled and fitted with a low slanting windshield. The Six-45 and Six-66 are continued with practically no change in the chassis, the chief improvements being in body refinements. As in former years, Continental engines are fitted, that of the Six-36, the new addition, having a 2⅞ in. bore.

Moore

Moore Motors Vehicle Co., Minneapolis, Minn.

THERE are no radical changes on the Moore 30 for 1918. The chassis is built in a very substantial manner, and the body extends over the frame in the rear slightly, which gives more leg room in the rear tonneau, not generally found in cars of only a 106-in. wheelbase. The same four-cylinder engine of 3¾ by 4¼ in. is used.

Murray

Murray Motor Car Co., Pittsburgh, Pa.

A NEW four-passenger touring car and roadster are on the 1918 Murray program. These have Rolls-Royce type radiator with straight low-body effect. The short bevel corner is carried entirely around the body of both models, the lower edge of which is in line with the hood hinge. Hartford shock absorbers are stock equipment. The seven-passenger Murray remains the same, with a few refinements. The bodies are of aluminum, with hand-buffed leather upholstery.

Nash

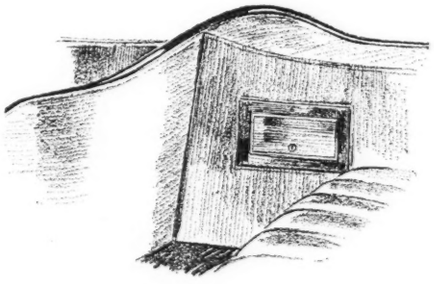
Nash Motors Co., Kenosha, Wis.

THE new Nash six is an entirely new product, abounding with refinements both mechanically and in the body. Simplicity marks the construction of the engine which is a valve-in-the-head six with a bore of 3¼ in. and stroke of 5 in. The powerplant, as well as the entire chassis, is very clean in design, and there is not an unnecessary rod or cross bar in evidence anywhere. There is a special means for heating the air and a manually-controlled shutter for varying the amount of incoming cold air. Starting, lighting and ignition is by Delco. The emergency brake is on the driveshaft, as well as the speedometer drive. There are three body styles on the new chassis, a five-passenger touring, a four-passenger roadster on the 121-in. wheelbase and a Springfield sedan on a 127-in. wheelbase chassis, which differs only in the length. As the seven-passenger member of the line the Jeffery six is continued, but carries the Nash nameplate.

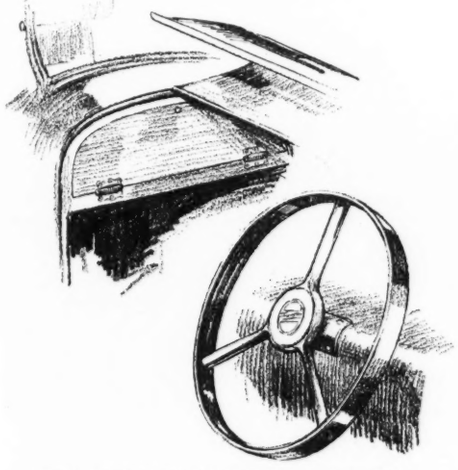
National

National Motor Car & Vehicle Corp., Indianapolis, Ind.

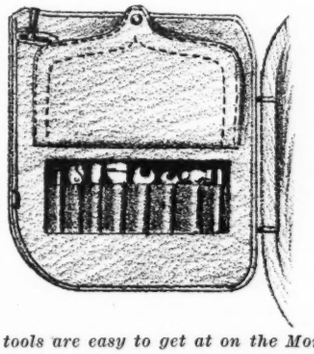
THE National Highway six and twelve are continued for the coming season without important change. The intake system brought out last year, which is designed to handle very heavy grades of fuel with satisfaction, is retained. The chassis is identical with last season's and one of the outstanding features is the long cantilever springs which National has been using now for nearly five years. There are three principal body styles, a seven-passenger touring, four-passenger sport type phaeton and a four-passenger roadster with cloverleaf seating. The six is characterized by its long and graceful line which has been a National feature for several years.



The Chevrolet eight has a mahogany locker on each side in the rear compartment



Two Lexington details, the cupboard in the cowl and the dummy wheel which carries the extra tire



The tools are easy to get at on the Monroe car in a pocket on one of the doors

Nelson

E. A. Nelson, Detroit

THIS very original car is coming through for 1918 without any changes to speak of. There are many unusual features about this car which are more in line with unusual location of parts than any mechanical innovations. Interesting items in the make-up are the overhead camshaft and the unit transmission assembly, in which is incorporated the clutch, gearset and rear axle gears.

Oakland

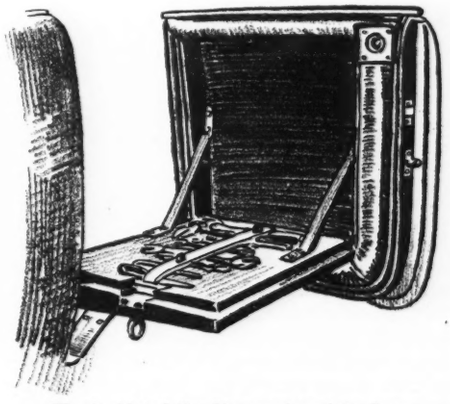
Oakland Motor Co., Pontiac, Mich.

THE outstanding features of the 1918 Oakland six are the longer cowl, sloping windshield, tire carrier on rear and larger protecting apron in front of radiator. The overhead-valve six engine is retained, but a few changes have been made. The valves are larger and the pistons aluminum. Also the single-unit system of starting and lighting has been replaced by a three-unit Remy installation. An addition to the line of closed cars is the roadster coupe. The new Oakland sedan has the general lines of the five-passenger touring model and is finished in coach green, the top above the door line being black. The five-passenger is very roomy, having a rear seat 48 in. wide inside the upholstery, while the front measures 41 in. The rear springs are 52 in. long, and like the front underslung from the axle.

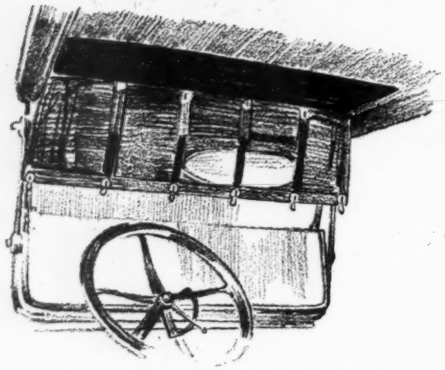
Oldsmobile

Olds Motor Works, Lansing, Mich.

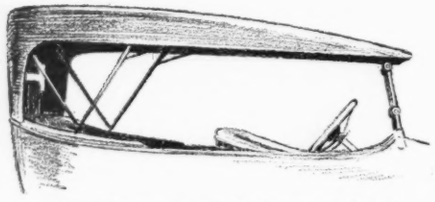
THERE is a new model Oldsmobile known as the 37. It is a six-cylinder job with a 112 in. wheelbase. On this model the ratio of power to car weight is exceptionally high. The crank checks on the crankshaft are so curved that their center of mass is also their center of gravity, giving a natural running balance. Model 45, the eight-cylinder Oldsmobile, is continued with very little change. The brake drums are larger, and there is a new method for preheating the incoming gases. The body remains unchanged on the eight-cylinder. Lynite pistons, which have been used for several seasons, are retained, and these



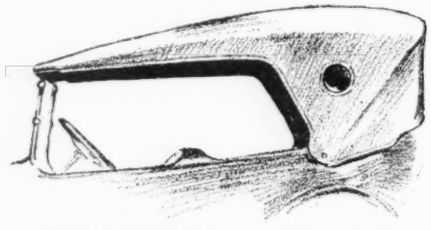
The inside of the Mercer door lets down, exposing to view a complete assortment of tools



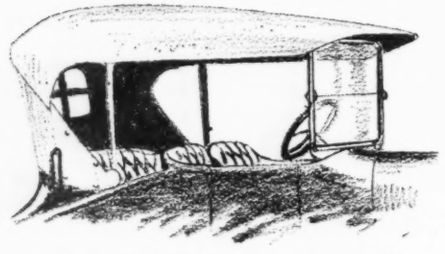
The top on the Dodge Brothers car has a compartment at the forward end for storing the side curtains



Clean cut lines of the Harroun top, which is in keeping with the general design of the body



Novel shape of the one-man top on the Stephens, which is fashioned after the Victoria top



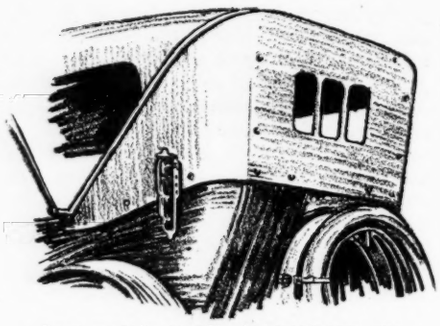
Top and upper body construction of the Peerless, showing the pronounced slope of body from the front seats

are so fitted with rings that the act of oil pumping has been reduced to a minimum.

Olympian

Olympian Motors Co., Pontiac, Mich.

ADDITIONS to the Olympian products consist of a sedan and coupe. The upholstery is a green pattern, having alternate weave of black and gray and black and blue. The sedan is Springfield type; all the windows and sides drop. The rear window is oval, stationary type, and the quarter windows are made to lift out and be carried in a compartment at the rear of the back seat. The belt line in this body is straight to preserve the parallel lines between the frame and top. There are a dome light, aluminum scuff plates,



Rear curtain on the Apperson car, carried well around the sides, affording protection to the passengers

pull-to handles for doors, silk curtains on automatic rollers in the rear windows and complete fittings throughout.

Overland

Willys-Overland Co., Toledo, Ohio

THERE have been such few changes in the Overland for the coming sason, that the line will be continued virtually the same as last year. Altogether there are now five Overland open models, ranging from the light four roadster to the model 90, which comes in two different wheelbase sizes, 104 and 106 in. The closed cars include a light four sedan, light six sedan and light six coupe. The Willys-Overland line offers a wide range of choice and comes on Overland, Willys six and Willys-Knight chassis and include both permanent and convertible types. The Overland bodies are unmarred by angles or projections. From the rounded edge of the radiator to the full curved back there is not a break in the line. The doors are flush, with hinges concealed and handles inside. The built-in windshield conforms to the curve of the cowl, and the crowned fenders and clean running boards emphasize the long low appearance. All controls are within easy reach of the driver; push buttons for ignition, lights and horn being on the steering column. The clutch and brake pedals are adjustable so persons of different height can drive the car comfortably.

Owen-Magnetic

The Baker R. & L. Co., Cleveland, Ohio

THE 1918 model Owen-Magnetic is worked out along cubist design—radiator, hood cowl, hardware, windshield, as well as body. Of course, the Owen-Magnetic transmission used on previous models constitutes the big feature of this car. An extra step for an electric brake is placed on the floor board in the form of a foot switch. For convenience a compact air control and a light switch are placed on the steering mast within easy reach of the driver. The front cross member of the frame has been worked out to form a neat splasher, as well as a rigid cross member to prevent the frame weaving.

Packard

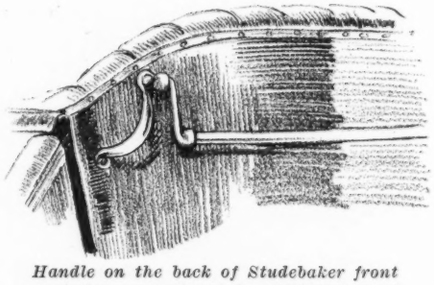
Packard Motor Car Co., Detroit

BETTER body lines, sloping windshield, relocation of the steering column control on instrument board, single wire system, and center gearshift are characteristics of the new series 3 Packard. Bodies are lower than last season and the front seat has been narrowed to get a streamline effect. The side lights are now in the windshield and the door hinges are invisible, but handles are still on the outside. Four bodies, the two-passenger runabout, 35 phaeton, cab side limousine and landaulet of last year have been dropped. The coupe has been changed to four-passenger. Six and seven-passenger broughams replace the four and five-passengers of last year. There is also a six-passenger brougham of square-cornered design. All open bodies are now made of steel in place of aluminum. The fenders have been changed to one-piece design and are more rigid than the series 2. In short, body alterations have been manifold, resulting in a far-better appearing product. Mechanically there is a slight difference in the intake manifold, cylinder heads are detachable, and a new form of clutch brake is fitted. The springs have been hung lower on the axles. Front and rear wheels are interchangeable. The Packard clutch has been retained but simplified. A more decided rake has been given the steering column.

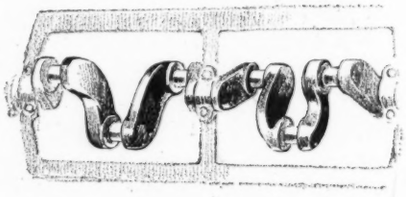
Paige

Paige-Detroit Co., Detroit

REFINEMENT in bodies and several mechanical details are in evidence on the new Paige models. For instance, there are a electric gasoline heater in the carbureter bowl, hot-spot in the intake manifold and automatic valve polishing device. The new chassis is known as the 55 and has the engine three-point suspended. Cylinder design has been refined, valves located differently and the intake manifold improved. Lubrication is better and a lock, which is an integral part of the transmission cover, renders the car thief-proof. The body design on the Essex, which is the new seven-passenger touring car, has the originality and unusualness of a custom-built body. It has a gracefully-rounded back and the nickel-trimmed top with gypsy back curtain suggest an added comfort for the back seat occupants. Up-



Handle on the back of Studebaker front seat for convenience in getting in and out of the tonneau



Peculiar shape of the Oldsmobile crankshaft, which is balanced. The center bearing also is plainly shown

holstery of the Paige cars makes use of a French glaze, hand-buffed leather.

Pan-American

Pan American Motors Corp., Decatur, Ill.

THIS car made its debut last year and consists of a five-passenger touring model fitted with a Rutenber engine. The body is low and very graceful in design, having a double cowl. The windshield has a very pronounced tilt and the whole idea of construction has been to give to the car an impression of speed, combined with comfort.

Paterson

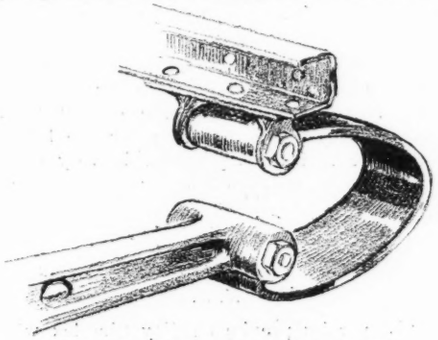
W. A. Paterson Co., Flint, Mich.

PATERSON has added a sedan to its line for 1918 and this constitutes about the only important item so far as these cars are concerned for the coming season. The new sedan has the conventional divided front seats and staggered doors. The other body styles include a five-passenger six, which can be converted into a seven-passenger by the addition of auxiliary seats for $30 extra, convertible sedan and four-passenger chummy roadster. The same six-cylinder Continental engine is used.

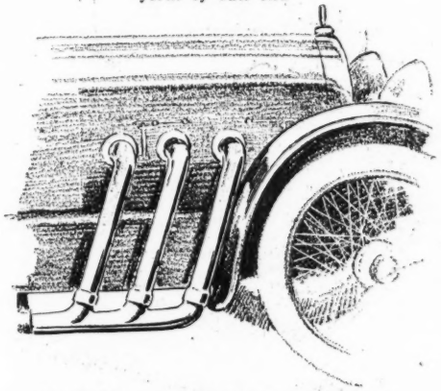
Peerless

Peerless Motor Car Co., Cleveland, Ohio

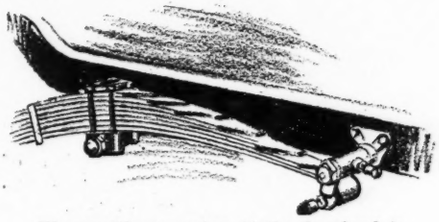
THE Peerless eight-cylinder will be continued for another season without great change. This company is still a believer in thin spring leaves and plenty of them and has found nothing superior to the platform type suspension in the rear. Of special advantage in the high-speed engine used in the model 56 is the double-range carbureter, utilizing the small throat and nozzle for the moderate driving ranges and a large throat for fast driving. This gives economy on the one hand and speed and power on the other.



Front end of torque arm on Roamer. The spring replaces the more conventional form of ball end



The Velie sport model exhaust pipes are on the outside. They enter a common lead to the muffler



The cantilever spring of the Overland is pivoted at the center and carried at the front by a shackle

Pennsy

Pennsy Motors Co., Pittsburgh, Pa.

A FOUR-cylinder five-passenger touring and four-passenger roadster on the same chassis constitute the Pennsy line for 1918. Straightline body designing with a long graceful hood gives the car an appearance of speed. The deep upholstery augments the sense of roominess and a touch of smartness is added by a well-sloped windshield. Interior features of the roadster consist of a spacious aisle between the front seats and the adjustable feature of the latter.

Pierce-Arrow

Pierce-Arrow Motor Car Co., Buffalo, N. Y.

IN all essential details all three models of the Pierce-Arrow six-cylinder are the same as before. Slight changes have been made here and there, but these consist merely of refinements. Naturally, the high-class finish and complete equipment are retained.

Pilot

Pilot Motor Car Co., Richmond, Ind.

A NEW demountable sedan and coupe have been added to the Pilot line, which gives it a total of four body types now. While particularly suited for winter use, the two models are equally well suited for warmer weather, as the tops can be removed entirely and replaced by touring tops. The sedan seats five and the coupe four passengers. The coupe contains space under the rear deck for storing baggage or parcels, access being through an opening in the back of the rear seat.

Premier

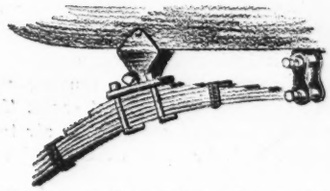
Premier Motor Corp., Indianapolis, Ind.

NEW things in the Premier line consist of a limousine-sedan, the top of which is built integral with the body in such a way that it can be changed to limousine, sedan or open touring car at a moment's notice. The glass panels drop into pockets in the side panels when not used. The newcomer is smart in looks, partaking freely of European closed car standards. It is carried current with the Premier touring and foursome.

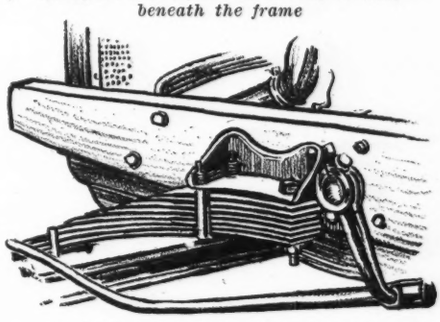
Regal

Regal Motor Car Co., Detroit

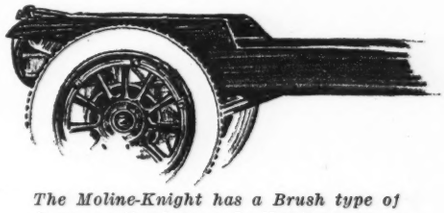
THERE are practically no changes in the 1918 model Regal, for this company believes the adoption of a one-model design is far more satisfactory to the general public than to try to maintain yearly models. There are a few refinements in this season's model. For example, Atwater Kent ignition has been adopted and also the Auto-Lite starting and lighting system. These are the more important changes, the others being in the smaller details of equipment and body.



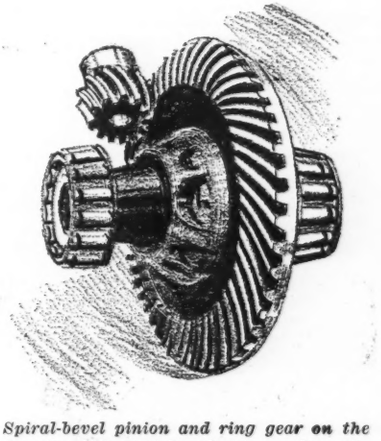
Manner of supporting the cantilever spring on the Regal. It is hung directly beneath the frame



Front spring bracket and steering arm of the Saxon. The former is very rigid to take heavy strains



The Moline-Knight has a Brush type of frame, quite deep and allowing a very low seating arrangement



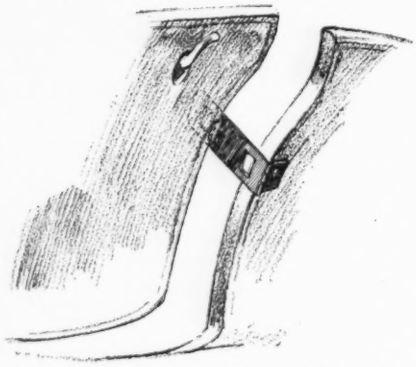
Spiral-bevel pinion and ring gear on the Dorris differential, showing also the roller bearings

Reo

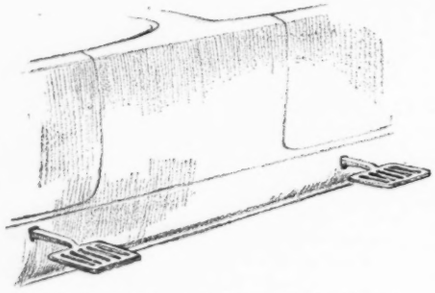
Reo Motor Car Co., Lansing, Mich.

THE Reo line for 1918 is continued with but little change in design. There is offered besides the model M seven-passenger touring car a four-passenger roadster and seven-passenger sedan. The six-cylinder Reo engine has a bore and stroke of 3½ by 5⅛ in. respectively. Semi-elliptic

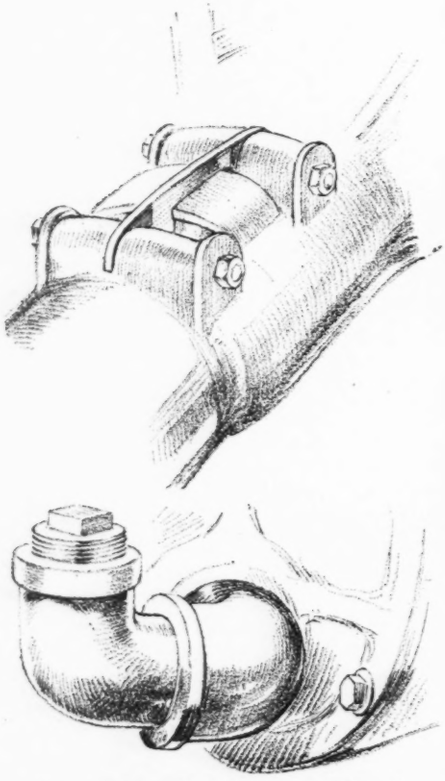
springs are used in front and cantilevers in the rear. Body lines are conventional, and the windshield is given a good rake. The auxiliary seats in the touring model fold into the back of the front seats. There is a special means of heating the air to the carbureter, and the inlet lifter mechanism is so arranged that there is a better alignment for the roller follower.



Ventilating device on the Mitchell, so the doors can be held partially open in extremely hot weather



The Cunningham has a sod pan the entire length of the car. Under each door is a ribbed step



Drive pinion adjustment on outside of Pan-American driveshaft tube, and, below, oil filler on differential housing

Roamer

Barley Mfg. Co., Kalamazoo, Mich.

THE same high-class construction of chassis and body characterizes the Roamer line for 1918. There is a four-passenger and small seven-passenger touring, mounted on a 128-in. wheelbase. These models have the Continental 9N engine with balanced crankshaft. Special coach-built bodies can be had for this chassis. The four-passenger sport car and seven-passenger touring cars are equipped with the Roamer-Duesenberg engines. This engine is small bore, long stroke and capable of very high speeds. The small Roamer cars have a special form of torque arm mounting on the front end in the shape of a semi-circular shaped flat spring, one end of which fastens to a cross member on the frame and the other to the torque arm end. This construction tends to eliminate rattle. Rear springs are now semi-elliptic, underslung from the axle. Standard equipment includes cord tires and wire wheels.

Saxon

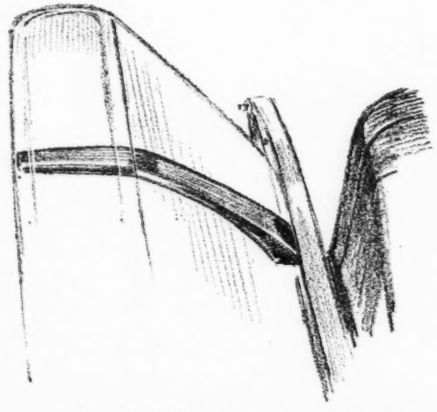
Saxon Motor Car Corp., Detroit

THE changes in the model Y-18 which supersedes the S-4-T Saxon Six consist mainly of refining the body lines. On the six the upholstery is of genuine leather, of the pleated type, being easier to keep clean and longer lived. The side curt ins are of the quick acting type carried in envelopes in the top and may be easily removed or replaced. Leather pads are now placed on all doors, keeping them from being soiled. The B-5-R four-cylinder Saxon roadster is continued for 1918 without any changes.

Sayers

Sayers & Scoville Co., Cincinnati, Ohio

THE most recent announcement of this concern is a lightweight six made of standard units and weighing, equipped for the road, about 2600 lb. There is nothing radical in its construction. The design is sound all the way through, for the company has been building chassis for different purposes for ten years. The body is five-passenger, with long graceful lines. It has center cowl and French pleated upholstery. The chassis is black and the body ultramarine blue. The engine is a Continental six with Delco starting, lighting and ignition.



Pressed steel fender bracket on the Glide, which is of large dimensions and built to hold fenders rigid

Scripps-Booth

Scripp-Booth Corp., Detroit

ADDITION of a six-cylinder model for 1918 marks the important change in mechanical features as Scripps-Booth heretofore has been confined to fours and eights. The latter will be continued with the addition of the six. In the body styles there is also an amplification, as in addition to the roadster and sedan which heretofore formed the range of body models, the new six appears as a full five-passenger and a three-passenger. These continue the distinct characteristics of Scripps-Booth design, and particular prominence is given the straightline feature of the five-passenger and the special pattern of the one-man Victoria top. The six-cylinder is a valve-in-the-head engine, block cast, $2\frac{13}{16}$ by $4\frac{3}{4}$, with pump cooling, pressure oiling, Remy two-unit starting, lighting and ignition. The clutch is a leather-faced cone, a departure from the disk type used in the four and eight. The wheelbase is 112 in., 2 in. longer than the four and 8 in. shorter than the eight. Wood wheels are an innovation for Scripps-Booth and appear on the six.

Shad-Wyck

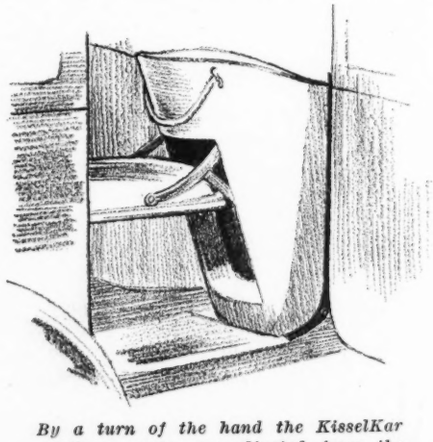
Shadbourne Brothers, Frankfort, Ind.

THE models A and B Shad-Wyck have a 128-in. wheelbase and use a Continental six-cylinder engine, the latter a $3\frac{1}{2}$ by $5\frac{1}{4}$ of the Continental L-head design. Ignition is supplied by an Eisemann magneto, and such standard parts as Warner gearset, Timken axle, Gemmer steering gear, etc., are used in the construction. Body lines are patterned after the latest practice and the equipment is very complete.

Simplex

Simplex Automobile Co., New Brunswick, N. J.

AS per its previous policy Simplex will make a chassis only. This year's



By a turn of the hand the KisselKar auxiliary seats are adjusted from the front seat backs

model also is called model V and has an engine the bore of which is 4.375 and the stroke 6.25 in. One of the Simplex features is the exceptionally long wheelbase, which is 143½ in. Tire size and wheels are optional with the purchaser this year.

Singer

Singer Motor Co., New York

SINGER will continue its line of high-priced cars with few changes. The wheelbase has been increased 3 in. to 139 in. and there is a slight change in the gear ratio. While the major percentage of bodies are custom built the concern is marketing a standard roadster, touring and closed cars. All these bodies are characterized by superb coach work and the seven-passenger touring design has the Belgian double cowl. The rear spring construction is such that the springs are flat under load and therefore produce easy riding.

Standard

Standard Steel Car Co., Butler, Pa.

THERE are no radical changes in the 1918 Standard six, for the company has found that the cars perform to its entire satisfaction. However, to improve on the starting in extremely cold weather the wiring has been arranged so that battery ignition is obtained in starting, which is cut out as soon as the starting switch is released. The springs also are made up of more leaves per spring, the leaves being thinner than before.

Stanley Steamer

Stanley Motor Carriage Co., Newton, Mass.

OUTSIDE of a probable increase in price the Stanley steamer will come through in 1918 without any radical changes. The price of the present model five-passenger Stanley is $2,400 and that of the seven-passenger, $2,500.

Stearns

F. B. Stearns Co., Cleveland, Ohio

FEW mechanical changes are noted on the new Stearns cars. Most of them are in the nature of refinements. For instance, on the eight the oil pump has been placed lower on the crankcase so it does not have to lift the oil. Likewise the oil distributor unit has been cleaned up and simplified. I-beam connecting rods have replaced the tubular type, pistons are lighter and the wrist pins are carried on bronze bushings. Both the eight and four now use the multiple-disk clutch and carry the fuel tanks on the rear instead of in the cowl. The new models are featured with a more complete line of bodies, each characterized by the straightline design at present popular. The distinctive white bordered Stearns radiator is retained, but the lines leading from it to the back of the car are more snappy. This is accentuated by an increased tilt in the windshield on the open cars.

Stephens

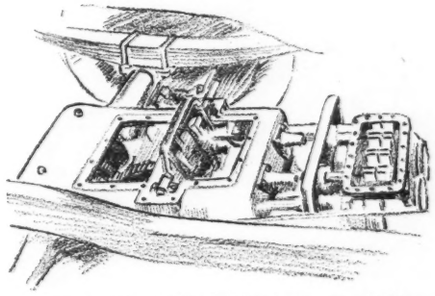
Stephens Motor Branch of Moline Plow Co., Moline, Ill.

NICETIES in equipment set off the new sedan and sport model of the Stephens six. Particularly harmonious lines are found in both. The sport model is a narrow four-passenger job fitted with a semi-Victoria top. The right front door is equipped with a vanity set containing everything from whiskbroom to a box of soap. The sedan has two unusual features, one the complete elimination of heavy posts supporting the top, and the other a complete water-proofing means, which insures a dry interior at all times. Whipcord is used for upholstery. There are but two doors, giving access to the rear through divided front seats.

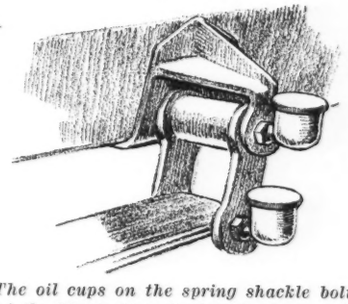
Studebaker

Studebaker Corp., South Bend, Ind.

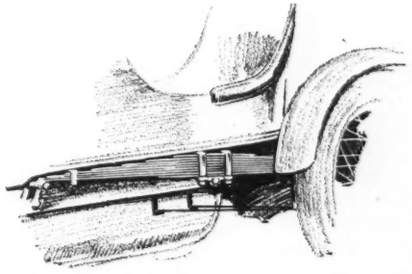
STUDEBAKER has brought out an entirely new line of body styles for 1918. The new cars are featured with a gracefully rounded radiator from which the hood and body are molded in a straightline effect, the seven-passenger six having an additional touch of elegance by a neatly beveled edge extending entirely around the body. The fenders on all models are oval and fitted with large aprons, the latter so fashioned that they blend well into the general design. The windshield on all models is tilted. The six-cylinder five-passenger and seven-passenger are mounted on a 126-in. and 119-in. wheelbase, respectively, while the four-cylinder five-passenger has a wheelbase of 112 in. In addition the bore of the four-cylinder has been changed from 3⅞ in. to 3½ in. while the bore and stroke of the two sixes is 3½ by 5 in. in the smaller and 3⅞ by 5 in the larger. Tires are smaller this year also. The seven-passenger has tires 33 by 4½ in. and the five-passenger six, 32 by 4 in., while the four-cylinder carries tires 32 by 3½ in. Spring suspension has been changed also, the three-quarter elliptic being replaced by semi-elliptics. The springs on the four-cylinder are lighter than those of last season.



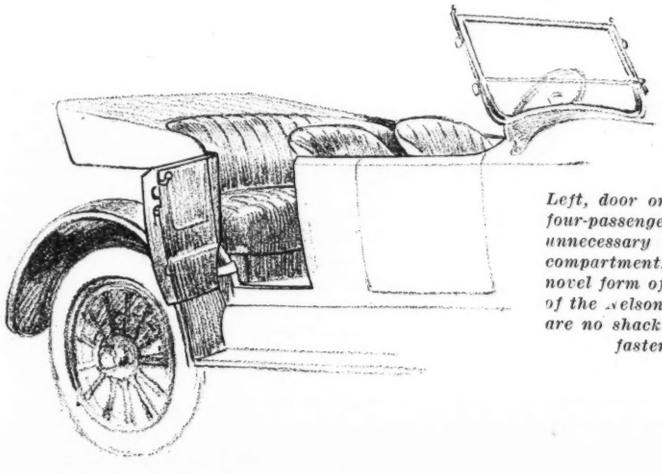
The engine of the Doble steam car, with cover plates removed. It is placed at the rear



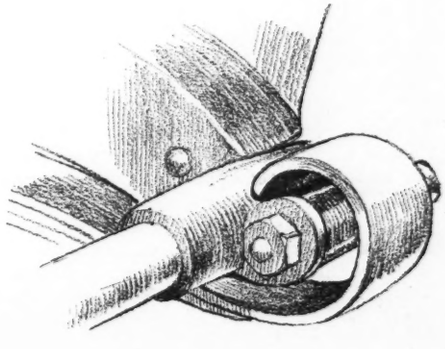
The oil cups on the spring shackle bolts of the Westcott replacing the more common grease cups

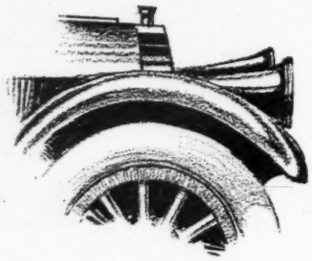


Cantilever rear spring on the Disbrow. The cables for the brakes are shown coming out of the undershield



Left, door on the Stearns-Knight four-passenger model, making it unnecessary to go through front compartment. To the right, novel form of securing the springs of the Nelson to the frame. There are no shackles; the main leaf is fastened as shown





The headlights of the Pierce-Arrow are made integral with the front fenders, eliminating all chance of rattle

Stutz

Stutz Motor Car Co., Indianapolis, Ind.

ALL 1918 models of the Stutz have the sixteen-valve engine. Besides the familiar Bearcat, there is the Bulldog special coming in both four- and six-passenger bodies and a two-passenger roadster. All are mounted on a standard chassis of 130-in. wheelbase. There is now to be found an instrument board, heretofore foreign to Stutz practice, of neat design, and the cowl and hood have been altered to give a better blend to the body lines. The conventional right hand drive has been retained. An overlapping windshield is one of the refinements giving better protection in stormy weather. The tire size has been decreased by 2 in. to 32 by 4½. The engine remains the same, retaining such features as the waterjacketed manifold, flexible hot-air tube to carbureter, etc. Little refinements are noticeable on the chassis. For instance, the hood clasps are novel, also the manner of mounting the magneto and locking it in with a thumbscrew. The manner of carrying and locking the spare wheel is simplicity itself. The Hartford shock absorbers are fitted with swivels at their extremities to allow for side sway of the body.

Templar

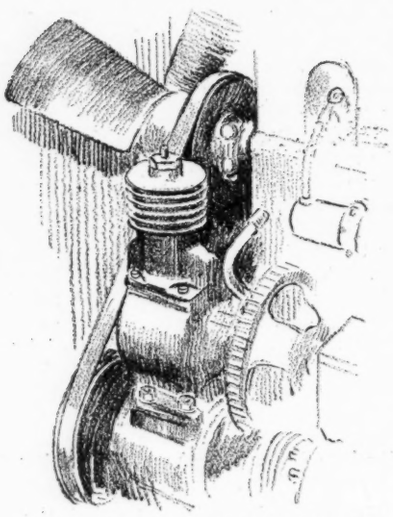
Templar Motors Corp., Cleveland, Ohio

THE Templar line for 1918 includes a two- and four-passenger roadster, five-passenger touring and five-passenger sedan. All are mounted on a 118-in. wheelbase. The company makes its own engine, which is a four-cylinder, 3⅜ by 5½. Other features include a Borg & Beck clutch, Zenith carbureter, Detroit gearset and American rear axle.

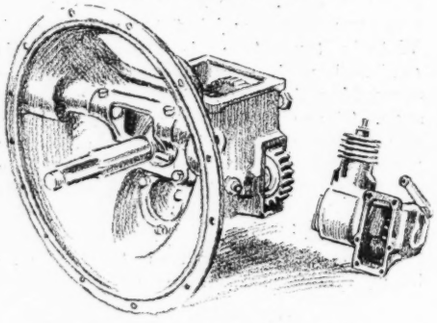
Velie

Velie Motor Vehicle Co., Moline, Ill.

VELIE Biltwell sixes for 1918 are larger than their predecessors. All told there are nine body styles, with two chassis, the same as previously, but the smaller this year is larger than last year. A special sport model is among the additions. There are refinements not generally looked for in cars of this price class. The new Velies have a more graceful curve of body lines, a higher grade of upholstery and finish and many refinements of details not found in their predecessors. The smaller of the two chassis is designated as the 38 and has a Continental six engine with ¼ in. longer stroke than last year. Hotchkiss drive, a characteristic of Velie cars for years, is retained as is also the Timken



The accessible position of the Marmon tire pump, which is on the front of the engine and gear-driven



The Case tire pump is driven from an idler gear on the left side of transmission

rear axle. All electric wiring is inclosed in metal conduit with protecting fuses on each circuit. The sport model is a low-hung car, with individual steps replacing the running boards. The exhaust manifold extends through the hood and to the rear in a graceful sweep.

Westcott

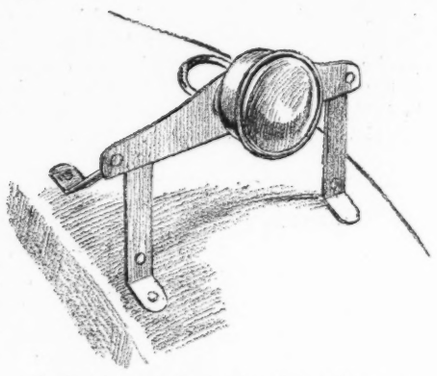
Westcott Motor Car Co., Springfield, Ohio

PRACTICALLY no mechanical changes differentiate the series 18 Westcott from the series 17. Body lines have been changed to conform to the latest ideas, but only a few details, among them cup lubrication instead of grease cups, mark the chassis. The new car has a built-in tool compartment in place of the former equipment, and a storm-proof windshield and self-acting top have been added. The Westcott car is an assembled car utilizing standard parts, such as Continental engine, Brown-Lipe gearset, Timken axles and Gemmer steering gears. They all are mounted on a 125-in. wheelbase and upholstered in dull finish, long grain leather in the case of the touring car and roadster and in a choice of cloth in the case of the convertible sedans.

Wolverine

Wolverine Motors, Inc., Kalamazoo, Mich.

THE Wolverine, which made its debut last fall, is a low-hung speedster capable of high speed. Aluminum is used wherever possible and chrome-nickel steel



Tail light and license bracket holder on the Franklin fastened to the fender in a substantial manner

in the wearing parts. The general design is unusual and the purchaser has the choice of any color combination. The engine is four-cylinder and capable of 75 hp. Ample provision is made to carry luggage.

White

The White Co., Cleveland, Ohio

WHITE cars for 1918 are identical with those of the previous season, except for one thing. Thirty-five by 5 in. tires are now fitted on all GM and GMT models. The sixteen-valve engine is retained without any change. While the cylinder is a T-head construction, the valves are set at an angle to the vertical, which leads the gases to their respective ports with the smallest amount of baffling effects. The chassis is made in two wheelbase lengths, 137 in. for the touring, limousine and landaulet and 124½ in. for the runabout, sedan and coupe. White bodies are very deep and the touring has a center-cowl divided front seat design and sloping windshield.

Willys

Willys-Overland Co., Toledo, Ohio

THE Willys-Overland models fitted with the six-cylinder engine are called the Willys-Six, while those having the Knight engine are known as Willys-Knight models. The Willys-Six line has been condensed somewhat for 1918 by a practical combination of leading features of models 85 and 88. The powerplant is the same as that used last year, a Continental with 3½ by 5¼ bore and stroke respectively. The new wheelbase is 120 in. The purchaser has the choice of three bodies for this model, a seven-passenger touring, a four-passenger cloverleaf, and six-passenger sedan. All bodies have the same characteristics as previous Overland models, but there has been a general refinement of detail. A thing to appeal to tourists is that the front seats in the club four-passenger are adjustable in a forward and backward direction, with an aisle between. Like the other Willys-Overland models, the Willys-Knight is continued for 1918 without much change. The four uses an engine 4⅛ by 4½ in., while the cylinder dimensions of the eight is 3⅜ by 4 in. The wheelbase of the former is 121 in. and that of the eight 125 in. A Tillotson carbureter is used on the four and a Zenith on the larger car.

(Concluded on next page)

The Motor Car Repair Shop

Locating Trouble in Starting Motor

THE location of trouble in the starting motor system will be considered first. This type of starting motor is one without Bendix drive in which the starting switch has two or three contacts and acts as a rheostat when starting the electric motor. To have the starting motor gear engage properly with the flywheel, the gear must be rotated slowly before engaging and this is accomplished by what is termed a first contact in the starting switch. If there is a high resistance in the line this will cause the starting motor to fail to operate on the first contact, resulting in difficult engagement with the flywheel. Trouble of this nature ordinarily is due to sulphated battery terminals, as these conditions offer a very high resistance to the flow of current from the battery. Therefore, it is necessary that these terminals be both clean and tight in the battery bus bar. In this connection it would be well to examine the battery terminal screws, as these sometimes bottom in the thread, and while the screw itself may be tight, the terminal is loose in the battery bus bar which soon results in sulphation of the terminal. If the battery terminals are coated with vaseline this will in a measure aid in preventing sulphation. It might be well to state that a great percentage of the trouble in electrical systems is due to sulphated battery terminals, as this interferes with both starting and charging.

Examine Connections

Provided the above does not prove to be the trouble, then examine the starting motor cable connections and make sure that all of these are tight. Do the same at the switch connections.

If the trouble has not yet been eliminated, remove the cover to the starting motor brushes and examine for dirty commutator. To clean the commutator, remove the upper motor brush and clean through the brush holder with a piece of a cigar box about half the width of the holder, wrapped with No. 00 sandpaper, while the starting motor is running. This can be done by moving the sandpaper stick back and forth in the brush holder until the commutator is clean. Do not use any form of lubricant on the commutator as the carbon brushes absorb this, which will soon result in the return of the old trouble. This is a very important point and should be rigidly observed.

In some cases the failure to operate on the first contact can be traced to a loose connection at the series field connection or a brush holder jumper lead may be shorted on the brush holder or on the main motor terminal. Either of these cases will cause the motor to overheat.

The battery line drop at the battery terminals to the starting motor when under full load with an average battery should show a reading of about 5 volts on the voltmeter and should not drop below 3.7 volts, as this indicates a low battery.

There are several methods of locating grounds in this type of system. The following, however, has proved to be the most rapid and accurate in actual practice. To determine if there are any grounds present in the system, first remove one battery terminal and connect a voltmeter in series with the battery and line. Provided the voltmeter indicates a reading greater than 1 volt examine the wiring for grounds as a reading greater than 1 volt indicates a ground or some consumption of current in the line. Before proceeding to locate the source of trouble, first turn on the light switch. The voltmeter should give full battery voltage on the scale. If all lights are off and the load is removed from the battery and the voltmeter registers more than 1 volt, this indicates a ground in the wiring system, which will have to be removed not to have the battery discharge itself. A voltmeter reading of less than 1 volt can be neglected, as this probably is due to a moisture ground at the battery base.

To prove that the system is free from grounds on either side of the battery line, place the voltmeter across the opposite battery terminal and short the other voltmeter lead to the frame. Next install the removed battery terminal in battery bus bar to complete the circuit. If the voltmeter reading is not more than 1 volt, then the wiring system is free from all grounds.

If the voltmeter does indicate a reading more than 1 volt it will be necessary to locate the source of trouble, and this can be done by removing the fuses at the fuse board until a fuse is located which, when removed, causes the voltmeter reading to become less. This proves that the trouble is located in the circuit which the fuse serves and it can then be located without much trouble, as the location of trouble nearly always requires more time than it does to repair it when once found.

It might be well at this time to consider the relation various conditions of the storage battery have to the electrical system and to interpret their meaning. Normally a battery should be inspected at least once every two weeks to determine if it has sufficient electrolyte and if the battery terminals are clean and tight. The gravity of the electrolyte in a storage battery when fully charged is about 1280 and its temperature should not exceed 120 deg. Fahr. when being charged, as the two greatest enemies of a storage battery are undercharging and overheating.

Cause of Overheating

Overheating is due to overcharging and is very apt to occur on long cross-country trips, while the same car may be driven for months in a city without the electrolyte temperature becoming too high. Thus the charging rate of the generator is more or less of a compromise, as if it is low enough to avoid overheating on cross-country trips, it will not be high enough for city driving to prevent the battery from running down. Overheating is liable to cause the plates in a battery cell to buckle and thus produce a shorted cell, which makes the battery unserviceable. If overheating has been taking place it can be noticed by the fact that it requires a considerable amount of distilled water to bring the electrolyte up above the level of the plates in a battery cell. If this condition is bad the battery will require water at least once a week. The real remedy for this particular case is to lessen the charging rate, as the car is covering too many miles in proportion to its number of starts. If the charging rate for a generator is high enough to keep the battery up for city driving then the driver making long-country trips can burn the lights to avoid overheating the battery.

When a battery runs down frequently it is almost certain the charging rate is not high enough to suit the conditions under which the car is operating. It will be necessary to increase the charging rate to prevent a repetition of the trouble.

Cars in Brief

(Concluded from facing page)

Winton

The Winton Co., Cleveland, Ohio

NO changes have been made in the Winton models. It is, moreover, not Winton policy to announce season models but rather to adopt what changes are found advisable as soon as arrangements can be made to put them through the factory.

Woods Dual Power

Woods Motor Vehicle Co., Chicago

THE present series of Woods Dual Power is a continuance of last season's series. The chief feature of this car is its powerplant, consisting of a Continental engine back of which is an electric generator and motor. Either can be used singly or together in driving the car. The electric motor is ready at all times to run the car independently or to assist the engine to run the car under a load. The lines of the body are harmonious and altogether the car is smart appearing.

Yale

Saginaw Motor Co., Saginaw, Mich.

YALE offers an eight-cylinder car of smart design and on which attempt has been made to reduce wind resistance to a minimum. The engine is a 3 by 5 in. and uses a Zenith carbureter. Final drive is by spiral bevel gears and the driving torque is taken through the springs.

The Readers' Clearing House

Wiring of 1912 Cadillac

—GIVE diagram of a 1912 Cadillac wiring.
—M. G. Doniphan, Charleston, S. C.

This diagram is shown in Fig. 1.

Cole-Delco Wiring Diagram

Q.—Furnish a wiring diagram for a Delco starting and lighting system, a 24-volt battery divided in four parts, 6 volts each. Starting switch on running board operated by clutch pedal and magnetic coil, as used on Cole car.—C. H. Kimpling, Miami, Okla.

This diagram is shown in Fig. 4.

Ward-Leonard System on King

Q.—I have an eight-cylinder King, model D, which has Atwater Kent ignition and Ward-Leonard starting and lighting system. Show diagram of the complete wiring of this car. State where each of the three wires from generator goes to.—W. E. Roese, Sioux City, Iowa.

In Fig. 3 is shown a wiring diagram of this car. As you will note from this, the three wires from the generator go to the automatic controller, the middle wire connecting to the terminal marked C. The other two are connected to points A and B, as indicated.

Wiring on Hudson 6-54

Q.—Furnish sketch showing the wiring diagram of a Hudson 6-54 1914 model.
2—Can a Bosch high-tension magneto be installed on this car?
3—Where can I purchase a 24-volt battery for a Hudson 6-54, 1914 model.—George Alberty, Pawhucka, Okla.

1—The wiring diagram of a Hudson 6-54 is shown in Fig. 8.

2—It would be possible to install a magneto on this engine, but it would mean a lot of work. For instance, if you wanted to drive off the pump shaft, you would have to disturb the generator position, etc. It may be possible to cut through the gear case and drive the magneto by a gear in the same manner as a gear-driven pump. But even in this case, it means a lot of cutting and fitting before a satisfactory job is secured. Then, too, there would be the bracket to think of, for the instrument would have to be mounted securely. We do not think the job would pay in the long run.

3—Most of the battery manufacturers can supply you with such a battery, but

TO assist readers in obtaining as a unit all information contained in this department on a certain subject in which they may be most interested, such as ignition, carburetion, etc., MOTOR AGE has inaugurated the segregation of inquiries into classes of allied nature. Questions pertaining to cooling will be answered under that head and so on.

THE ELECTRIC SYSTEM

M. G. Doniphan.....Charleston, S. C.
C. H. Kimpling.....Miami, Okla.
W. E. Roese.....Sioux City, Iowa
George Alberty.....Pawhucka, Okla.

MISCELLANEOUS

E. A. Johnston.....Amarillo, Tex.
Subscriber.....Stockholm, S. D.
Ford Driver.....Chicago
E. L. Viers.....Napoleon, Ohio
August Janssen.....Davenport, Iowa

ENGINES

Leon Mendelson.....New York
L. C. Stephenson.....Gaylord, Kan.
Arnold A. Pollack.....St. Louis, Mo.
Morton D. Walker.....Columbus, Ohio

No communication not signed by the writer's name and address will be answered in this department.

why such high voltage? The tendency nowadays is to fit systems using not more than 6 volts.

Miscellaneous

Kerosene as Anti-Freeze

Q.—What do you think of the use of kerosene as an anti-freeze?—E. A. Johnston, Amarillo, Tex.

Kerosene as an anti-freeze solution for radiators works out all right on cars fitted either with the thermo-syphon or pump circulation, but it is preferably used with the latter system. The customary practice is to fill the entire system with kerosene, not diluting it with any other substance. Two things might be said against the use of it for a cooling solution in winter, one is that it has faculties for attacking the rubber hose connections from engine to radiator; the second, its extremely unpleasant odor when the engine gets to running and the jackets are hot. Undoubtedly the high cost of alcohol and glycerine has induced many owners to try kerosene for a winter solution, due to its comparatively low cost. Kerosene by its very nature is not very pleasant to handle and we think the car owner will be better off in the long run, by using one of the proprietary compounds on the market. These are reasonable in price and put up in a convenient form to use. The makers of these have done all the experimenting in their laboratories and are offering products which in the majority of cases are safe for the owner to use. There is hardly any need, it seems, for the motorist to experiment with various anti-freeze substances when he can obtain such at moderate cost.

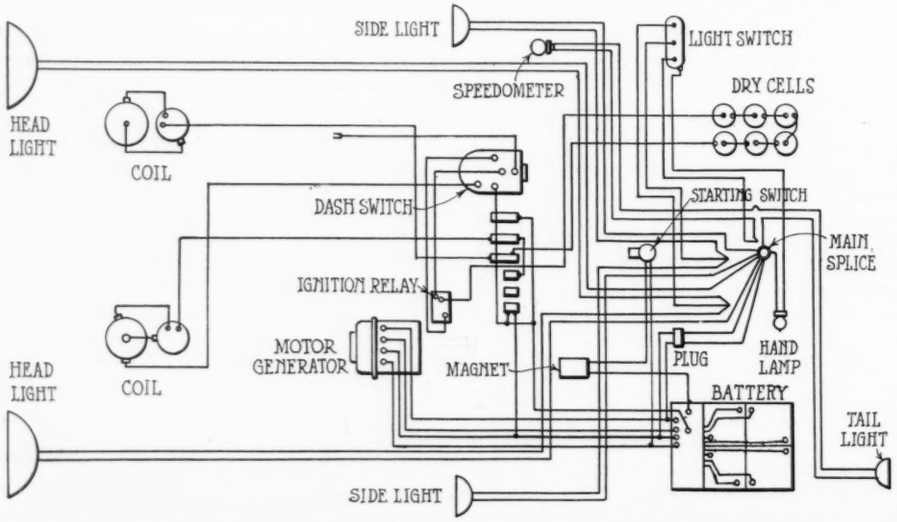


Fig. 1—Wiring diagram of system used on 1912 Cadillac

Bands Need Re-Lining

Q.—What should be done when the transmission bands on a Ford jerk? The car will not move until the pedals are pushed away in and then they will grab and give an awful jerk.—Subscriber, Stockholm, S. D.

The only thing to do with such bands is to remove them and fit new linings on them. This lining can be had at any Ford service station and is inexpensive, costing about a dollar for a set of three. To take out the bands proceed as follows:

Take off the door on top of the transmission cover. Turn the reverse adjustment nut and the brake adjustment nut to the extreme end of the pedal shafts, then remove the slow speed adjusting screw. The latter is on the outside of the housing. Remove the bolts holding the transmission cover to the crankcase and lift off the cover assembly. Before doing this take out the two bolts on top of the universal housing.

Slip the band nearest the flywheel over the first of the triple gears, then turn the band around so that the opening is downward. The band can now be removed by lifting it upward. The operation is more easily accomplished if the three sets of triple gears are so placed that one set is about 10 deg. to the right of center at top. Each band is removed by the same operation. It is necessary to push each band forward onto the triple gears, as at this point only is there sufficient clearance in the crankcase to allow the ears of the transmission bands to be turned downward. By reversing this operation the bands are installed.

After the bands are out take out the old lining by removing the rivets that hold it in place. The new lining is put on in the same manner, using new rivets. When this is done the bands can be put back, by reversing the operation of removing them. After being placed in an upright position, that is, in their normal position, on the drums, pass a cord around the ears of all three bands holding them in the center so that when putting the transmission cover in place no trouble will be experienced in getting the pedal shafts to rest in the notches in the ears. The clutch release ring must be placed in the rear groove of the clutch shaft. With the cover in place remove the cord which held the bands in place while the cover was being installed.

Why Engine Is Erratic

Q.—Some time ago I put in a new cylinder block in a car, and all the moving parts were new, with the exception of the crankshaft, camshaft and connecting rods, these parts being in

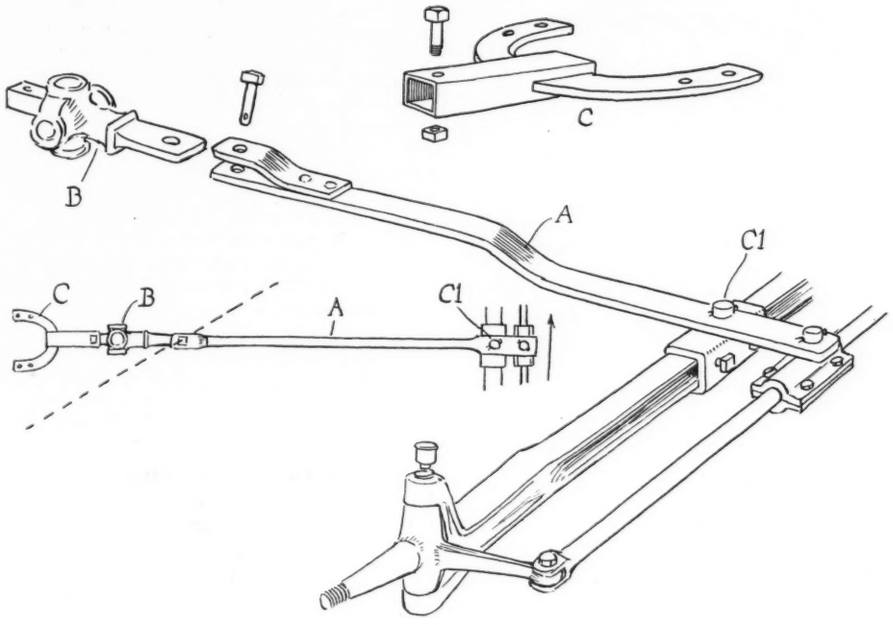


Fig. 2—Device for one-man tow bar for trailer

good condition. The wiring was also replaced by new. The engine runs erratic in a ragtime fashion. It does not give a good, loud, sharp bark as any Ford engine will do when the exhaust pipe is disconnected at the rear of the engine.

The valve timing and ignition timing are in accordance with the Ford timing chart, and I am certain that they are correct. I use the Holley carbureter that has been in use five years and the coil is a Kingston single-vibrator, working in connection with four silent coils. I had the magneto tested at the Ford service station and it registered 28 volts at its maximum, and was informed that it was O. K. The spark plugs work perfectly when placed in another engine and are all right. I have not been able to find any short circuits, and I notice when holding a screwdriver to the plugs it does seem to pull the engine down on one cylinder more than it will on another. The valves have been carefully ground. There is no miss due to valve action, as there is no misfire in the carbureter or exhaust pipe, as is common where the valves are at fault. The engine starts easy enough and fires the same when running on batteries as it does when running on the magneto. It has a spasmodic pick-up, and there is a noticeable lack of power. Is it possible that the carbureter or coil is at fault? After a careful study of the same I am inclined to think so. The engine ran the same way previous to changing cylinder blocks.—Ford Driver.

In stating your trouble you did not mention the compression of the cylinders, but granting that this is all right, we believe that you would be better off with a more modern carbureter. We recently had about the same experience with a Ford engine which was fitted with a carbureter of the 1913 vintage. The engine behaved in the same manner as yours and upon substituting a 1917 carbureter, it was a revelation to note the difference in the general engine performance. Starting was easier, acceleration better, in short, the mechanism was rejuvenated. Carbureter manufacturers have made wonderful strides in the last few years and the carbureters that performed successfully in 1912 and 1913 are wholly inadequate to cope with the heavy modern fuel. It is true that engines will run with the old instruments, but owners of such cars are not realizing the full value of the fuel they consume. Besides such engines are generally sluggish in their performance.

Before you condemn the carbureter, we would suggest that you make sure the coil units are in proper shape. Very often ignition trouble is mistaken for carbureter trouble and the inexperienced driver pounces upon his carbureter immediately when the engine misbehaves. Occasionally the condenser of a coil punctures, or the insulation breaks down in the interior structure. This results in erratic running and the trouble is often hard to find. Of course, weak coil units, improper connections, especially where the units come in contact with the metal strips on the interior of the coil box, will cause misfiring. If you are sure that everything is all right, valves, timing, compression, lubrication, plugs, wires, timer, etc., you may suspect the coil as not functioning properly, which should be returned to the makers for overhauling. Have you tried a new timer? The timer ring wears quickly sometimes and this allows the roller to jump over some of the contacts occasionally, causing misfiring, because the roller does not touch the contacts.

One-Man Tow Bar

Q.—How can I hitch a trailer made of the chassis of another car so it will follow in the tracks of car pulling it?

2—What would be the capacity of a Ford chassis?

3—Which would be better on the trailer, [illegible] pneumatic tires?—E. L. Viers, Napoleon, Ohio.

If you are going to use a Ford car to do the towing, you will have to prepare it in the following way. The spring clips retaining nuts on the rear are removed and a semi-circular shaped bracket as shown at C made to fit the rear end. It is not likely that a bracket shaped like C can be had without making it, and the metal will have to be heated to be bent. At B is shown a universal joint such as is used on the Ford. The male member of the joint is attached to the bracket C by means of a short piece of squared tubing, notched at one end to fit the bracket as shown. It is riveted to the latter. The joint is secured in the tubing by a bolt or pin which passes through both. Into the female member of the joint is fitted a piece of squared stock, the end of which has been flattened. This is also held in place by a pin. A hole is drilled in the flattened end for attaching the tow bar. This completes the parts that go on the head car.

The tow bar shown at A is made of steel, heated and bent to the shape shown. At its forward ends a piece of metal is attached with rivets or bolts. Holes are then drilled in both pieces, the holes being the same size as the one drilled in the part that was fitted into the female member of the joint. A hardened pin should be used to couple the units together. If a great deal of towing is to be done it may be well to fit bushings in the holes for the pin. The pin itself can be provided with a short length of chain or leather strap attached to the bar A so that it will not become lost. Two holes are drilled in the end of the tow bar which is intended to be attached to the second car or trailer. These two holes should be drilled on centers corresponding to the distance from the center of the axle beam to the center of the spindle arm connecting rod.

The axle used on the trailer is provided with a clamp to act as a pivot, around which the tow bar turns. This pivot is shown at C1. The pivot might be made by welding on a short length of round stock to the clamp partly surrounding the axle. This clamp is fastened to the axle by means of set screws, or if a permanent job is desired, with rivets or bolts. A

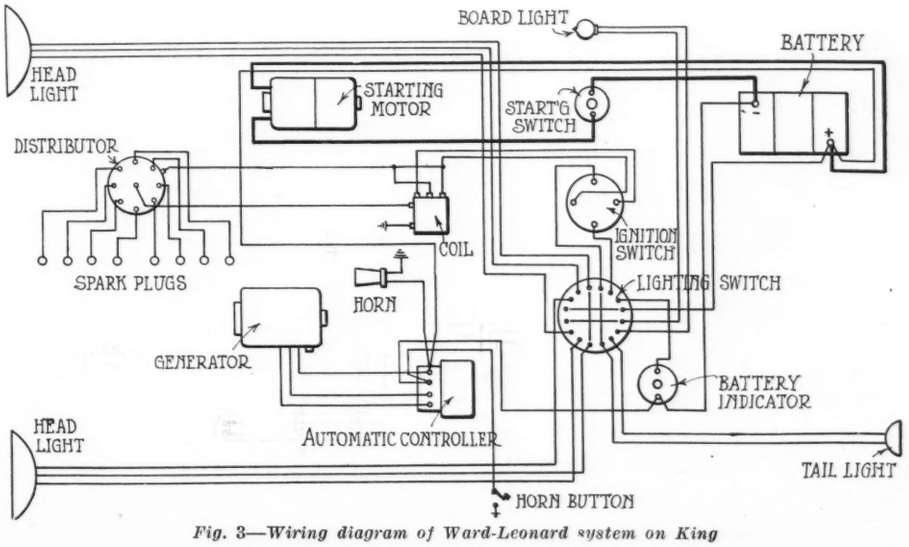


Fig. 3—Wiring diagram of Ward-Leonard system on King

similar arrangement is made in the case of the tie rod, but the clamp here is made in the form of a sleeve which must be slipped over the rod after having first removed the adjustable forked end which rides on the threaded portion of the rod at the left end. This sleeve is also secured with set screws. Fit bushings to the holes drilled in A for the pivot C1 and the pin on the tie rod, because there is bound to be wear in these places.

The action of the one-man tow bar can be easily understood by referring to the illustration. When the car doing the towing turns a corner, as indicated by the dotted line, the tow bar will be pulled in this direction. It will, however, pivot on the point C1, forcing the tie rod in the direction of the arrow. This will turn the front wheels of the trailer in the same manner as though some one were driving the car, and turned it by means of the steering wheel.

2—Roughly speaking about 1000 lb.

3—Pneumatic tires are better for a job of this kind. The solid tires are all right for speeds not over 15 m.p.h., but a trailer made of a Ford would have greater speed possibilities than this and the chassis would soon suffer from excessive vibration, if driven at high speeds.

Storing Car for Winter

Q.—Give instructions and show diagram for laying up a 1917 Ford for the winter.—Aug. Janssen, Davenport, Iowa

In storing a car select a place that is well protected, affording an even temperature and free from humidity. Never store a car in a barn where horses are kept if you can avoid it. The ammonia fumes are very detrimental to the finish.

After you have selected a place drain all the water out of the radiator and water jackets and then pour in about a quart or so of denatured alcohol. The latter is to prevent freezing of any water that may possibly remain in the radiator or jackets. Take off the cylinder head and clean out all the carbon deposits. Then put back the cylinder head, having first put plenty of oil on top of each piston, turning the engine over slowly to distribute the oil over the cylinder walls.

Draw off all the gasoline that may remain in the tank and also open the drain in the bottom of the crankcase and let the old oil run out. Put back the plug and

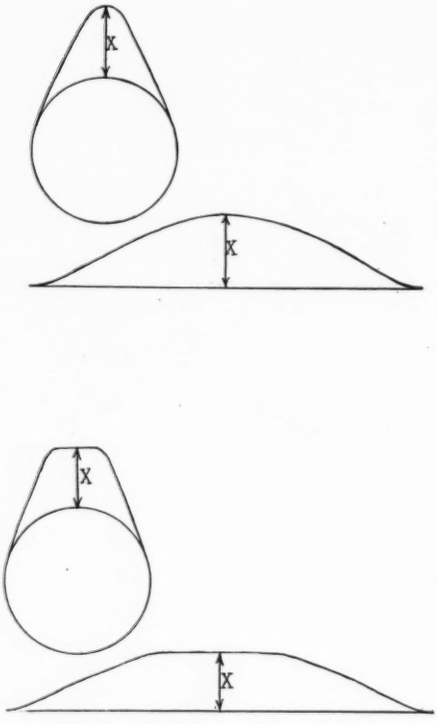


Fig. 5—Lift diagrams of tangential cam, below, and mushroom type of cam

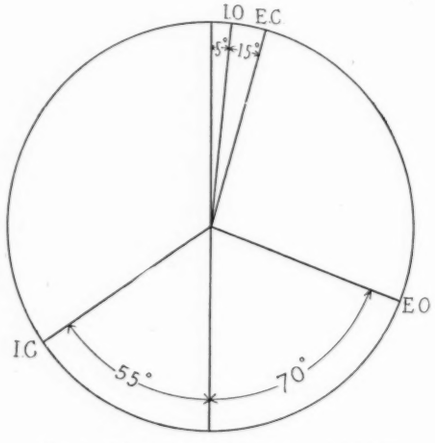


Fig. 6—Timing of valves in model 22-73 Mercer

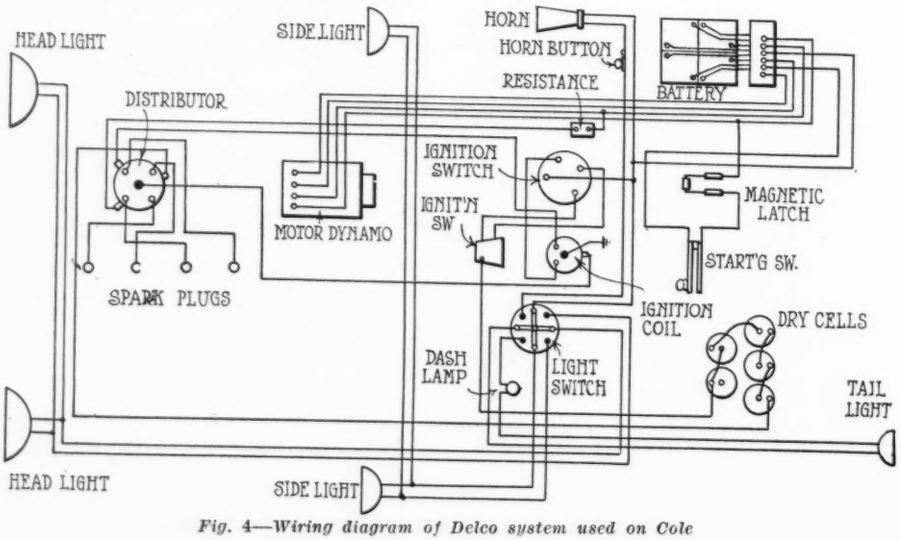


Fig. 4—Wiring diagram of Delco system used on Cole

pour in a gallon of kerosene oil, through the breather tube. Turn the engine over by hand fifteen or twenty times so that the splash from the kerosene will thoroughly cleanse the engine. Now remove the plug again and drain out the kerosene, which you probably will find quite dirty. Refill with fresh oil and turn the engine over again as before. This will insure a coat of oil on the working parts.

Take off the tires and support the car on wooden jacks, which you can make as shown in the illustration. When the car is on the supports take off the tires and wash them with water. Vulcanize all bad spots and fill the holes with tire putty. Put plenty of mica or talc on the tires and pile them one on top of another in a room that is not too hot or too cold. Leave the tubes in them in a partially inflated condition. Cover them up with burlap or paper.

Give the car a good washing and sponge off the upholstery with a solution of one part ammonia to nine of water, then rinse with clean water. Do not use gasoline for this.

When storing the car leave the top up, which allows it to remain in a smooth shape. Put the side curtains on also; it will give them a chance to stretch and they will fit much better in the spring, when a sudden storm may necessitate quick application of the curtains. Lamps and other bright parts should be cleaned, wrapped in cloth or paper and then stored in a closet. Slip a muslin cover or tarpaulin over the entire car and you can leave it until spring.

Engines

Engine Size of Mercer 22-73

Q.—Give bore and stroke of model 22-73 Mercer.

2—Give timing of valves in degrees on the flywheel of model 22-73 Mercer.—Leon Mendelson, New York City.

The bore is 3¾ in. and the stroke 6¾ in.

This is shown in Fig. 6. With reference to piston travel the inlet valve opens $\frac{1}{64}$ in. past upper center and closes $1\frac{5}{16}$ in. past lower center. The exhaust valve opens $1\frac{37}{64}$ in. before lower center and closes $\frac{9}{64}$ in. past upper center.

Best Cam for Speed

Q.—Which of the following diagrams of cams is best for speed, both having the same lift for both intake or exhaust valves? Which one will hold the valves open longer, and which one has the quickest opening and closing of the valve?—L. C. Stephenson, Gaylord, Kan.

The tangential cam which is used to a large extent by stock cars is shown in Fig. 5. This form of cam gives a greater area of opening than the mushroom type of cam shown in Fig. 5, as illustrated by the lift diagrams. The fact that the valve in the former case is open for a longer period permits a greater volume of gas to enter the cylinder and consequently results in more power being developed due to the heavier impulse in the cylinder.

The tangential type of cam requires a roller as a follower and the mushroom a follower with a flat surface.

In addition to these two forms of cam there is another form of cam known as the constant acceleration type which is commonly used in racing car practice. This type of cam lifts and closes the valve at a uniform rate and has a greater area of

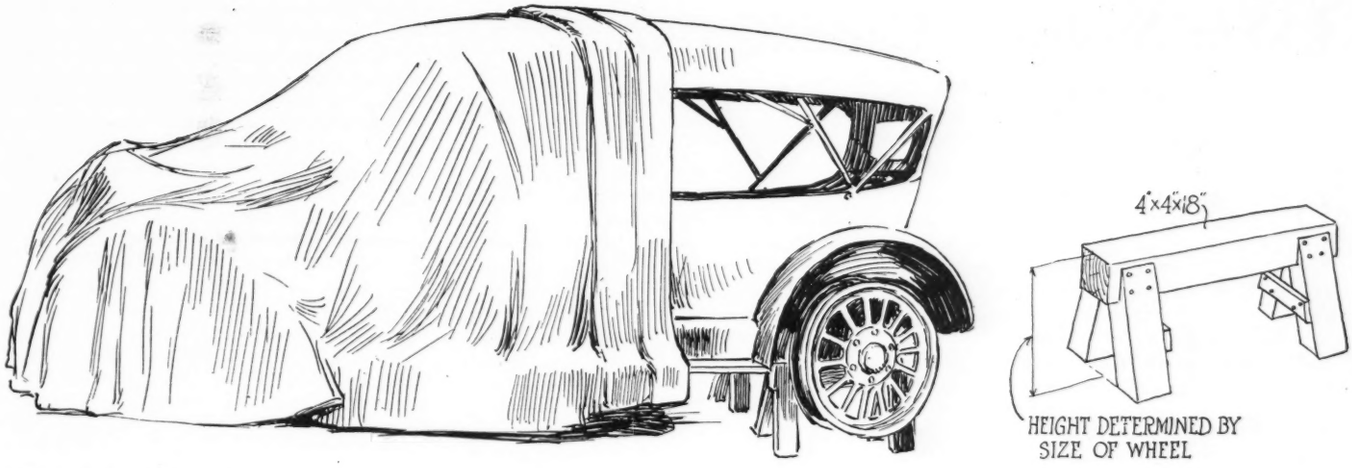


Fig. 7—Make four wooden supports to go under the front and rear axles for the car to rest upon, leave the top up and slip a cover over the car to keep out dust when storing it up for the winter

opening than either of the other two types and is, consequently more satisfactory for racing engines. In its modifications it is also adapted to stock cars in some instances where a large power output is in demand.

Overland Engine Heats

Q.—The radiator on my Overland 86-6 boils over on short runs. I have looked over the pump and found it O. K., replaced the rubber hose, both from radiator to pump and engine; took out all the pistons and scraped all the carbon from them and the cylinders, reground the valves, and still the circulation doesn't seem to work right. I drove this machine from Wisconsin to Kentucky, from Kentucky to St. Louis and since then I have been having this trouble.—Arnold A. Pollak, St. Louis, Mo.

We would suggest that the radiator be removed and flushed from the bottom as most of the dirt settles in the top and this will avoid carrying the dirt through the entire radiator core. If the radiator core is found to be blocked up, the cylinder water jackets also probably have deposits which have settled in the bottom of them thus rendering part of the water jacket ineffective for cooling purposes. This should be cleaned out. These deposits are quite common after a car has been in service for a year or so and are due to impurities in the water used.

Heat of Explosion Stroke

Q.—What is the heat of an engine at the explosion stroke and how high does it ever become?

2—Does the heat vary in different bore and stroke engines and revolutions per minute have any bearing on heat units?

3—What is the cooling effect on an engine with the intake stroke?

4—How hot and cool does an engine become while under working conditions?—Morton D. Walker, Columbus, Ohio.

1—The heat value of 1 lb. of gasoline is approximately 19,000 B.t.u. After the ignition of a charge of gas in a cylinder, the products of combustion are nitrogen, carbon dioxide, and water vapor, and if we consider the proportion in which these gases are present and the specific heat of each at constant volume, the total specific heat of the products of combustion will be about 0.20. Now if we assume the mixture to be in the proportion of 1 part of fuel to 20 parts of air, the approximate temperature due to combustion of the gas will be

$$\frac{19{,}000}{21 \times .20} = 4500 \text{ deg. Fahr.}$$

In actual practice, however, this value seldom exceeds 3000 deg. Fahr. as the exposed cylinder wall area acts as a damper on the use of temperature by absorbing heat. The chemical action which takes place due to combustion also absorbs heat energy and aids in checking the initial temperature. This latter theory is known as after burning of the mixture.

2—The heat would vary in this respect, that is, the amount of wall area exposed would probably influence the temperature slightly but not to any great extent. The greater the volume of the gas charge the greater the heat absorption due to chemical action. These considerations are both small and practically infinite.

3—The tendency in modern engine design is to utilize the heat lost via the exhaust as much as possible, hence various means are in vogue to heat the incoming gas. It is safe to say that the inlet gas temperature does not exceed 100 deg. Fahr. while the temperature of the spent gas through the exhaust is about 1000 deg. Fahr. Thus the average temperature of the combustion chamber is undoubtedly close to the latter value. As at an ordinary driving speed, say 25 m.p.h., the time interval for induction is about 0.003 sec. and as the gas is compressed to a high temperature in about the same time it does not exert a great deal of influence except to cool the inlet valve.

4—This depends upon the specific gravity of the fuel, the temperature of the surrounding air, and the character of the load. It will be found very difficult to warm up an engine burning gasoline on a cold winter day when the car is running on a good road and the engine has practically no load imposed on it. While if a heavy load is imposed on the engine, other conditions being the same, it will maintain its best operating temperature much easier. An engine burning kerosene will have a higher operating temperature than one using gasoline.

Clearance of Ford Vibrator

Q.—What is the proper clearance between the vibrator spring and the core of a K-W coil, the kind at present used by the Ford company?—Ford Driver.

No exact figure can be given for this adjustment, but with a little experience the owner is able to feel by the explosion when the point is reached where the engine seems to develop its best power. If the points are too close, that is, if the screw is turned too far to the right, it will cause the current to arc between the points. This hinders the flow of current and burns away the contact points, often putting the coil out of action. The usual method of adjustment is to turn the vibrator screw up until the vibrator stops buzzing; then turn the screw down slowly until the two points just come together and the explosions in the cylinder become regular, then give the screw an extra quarter turn.

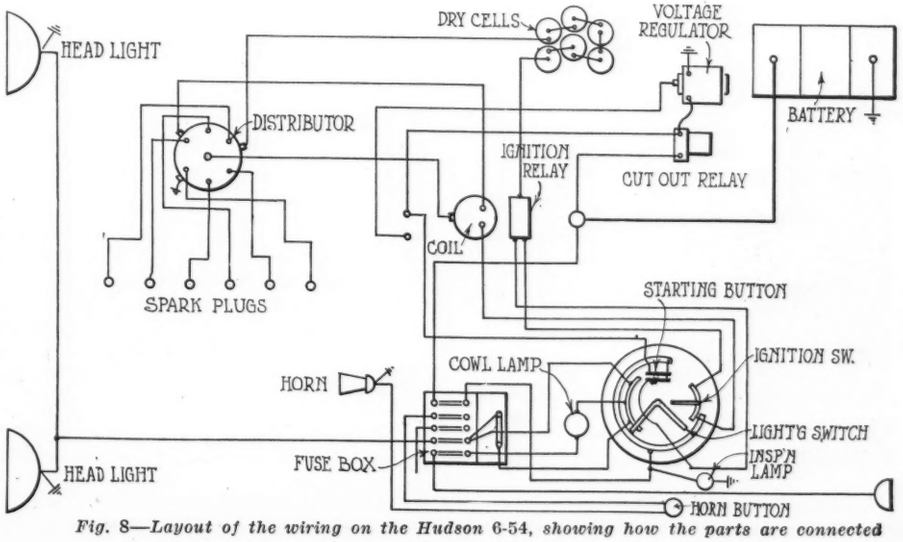


Fig. 8—Layout of the wiring on the Hudson 6-54, showing how the parts are connected

Labor Situation Continues Uncertain

Shortage of Skilled Labor in Certain Lines Exists Among the Plants

DETROIT, Dec. 28—The labor situation is adjusting itself rapidly to new conditions, and though at present the shortage of skilled labor generally is not keeping many machines idle, fear is expressed for the future. Passenger production has decreased slightly, war business has but started, mechanics from outside have been attracted by the high wages and hence have relieved the situation temporarily. The Ford Motor Co. states it is not hiring any men, and hence is not yet affected. But it is realized that if many men were desired the men would have to be taken away from machines in other plants.

The Packard Motor Co., which is already engaged on large war contracts, states that it could use many more skilled men but that many unskilled men are available. This plant is using women in some of its departments, such as top building, upholstering and inspection.

The employment office of the Timken Detroit Axle Co. claims the labor situation is easier than it was six months ago. However, it cannot get certain specialized experts. These are the toolmakers, die sinkers and men that do skilled individual work. These men are in demand to tool up the various factories for the coming production and the demand for such men is great. Efficiency men, time study men, etc., are also scarce, that is, real experienced men. These also are needed in placing material in production.

This in brief sums up the opinions of the labor superintendents of the various factories. The men that have had experience are all taken and are getting better pay than ever before, $10 to $12 a day. To date it is these men that the factories have desired, to put them on immediate production. But the supply of unskilled labor is large, and it is these that the factories must take, place under the direction of skilled men and train to do the actual manufacturing work.

JOHNSON GIVES WAR GIFTS

Racine, Wis., Dec. 31—S. C. Johnson & Sons, Racine, Wis., manufacturer of polishes, carbon removers and other chemicals and supplies for the motor car accessory trade, distributed $35,000 among employes as holiday gift, based on net earnings during 1917. The payment was made in United States War Savings certificates and thrift stamps to encourage the savings habit among the workers. Persons in the employ of the company from one to two years received 5 per cent of the total wages for 1917; from two to three years, 10 per cent; from three to four years, 12½ per cent, and so on until a maximum of 30 per cent was reached.

ENLISTING IN SIGNAL CORPS

Washintong, Dec. 28—The aviation section of the Signal Corps has authorized the following statement to clear up any misunderstanding which may exist as to the enlistment of men in or under the draft age on account of the recent rulings discontinuing voluntary enlistment as a general practice.

Flyers and balloonists may enlist as heretofore upon passing the examination at the nearest aviation examining board. Their relationship to the draft and to the draft board is seen to by the examining board. They themselves are ordered into active service as soon as possible and hold the status of privates, first class, Signal Enlisted Reserve Corps, with a salary of $100 a month, 60 cents daily allowance for food and quarters provided by the Government until their commissions are issued or they are discharged.

Non-flying officers of draft age or below are not now being accepted for service, except a limited number of graduates of recognized engineering colleges or others who can qualify as expert engineers; others may have their names placed on file at an examining board.

Aerial observers are not now being accepted, whether of draft age or not.

Enlisted men within the draft age may no longer volunteer at a recruiting office, but may be inducted voluntarily into service by their local board, if they are physically fit, sufficiently skilled, and not required to fill the current draft quota. They will be sent to Camp Kelly, Tex., for distribution into trades, training and formation into squadrons, with ranks and salaries running from $30 a month as private to $81 a month as master signal electrician, food and quarters provided by the Government.

TO AID WORKERS ON DRAFT

Detroit, Dec. 28—A meeting of about 150 factory employment bureau men have formed an organization for aiding employees in answering the draft questionnaire, and handling any matters that may arise in relation to the draft. This will become a permanent organization for the duration of the war and will handle all such matters as may arise in the future.

INDUSTRY HELPS RECRUIT MEN

Detroit, Dec. 28—Shop foremen having executive ability are given an opportunity to obtain commissions as lieutenants in the motor mechanics' regiment now being organized. The recruiting work is under the direction of Lieutenant-Colonel H. B. Joy and he is being given the complete co-operation of the factories and dealers. Examinations will be held in the salesroom of the Cadillac Motor Car Co., Dec. 29-Jan. 2, inclusive. R. C. Collins, president of the Cadillac Motor Car Co., with L. J. Robinson, Chalmers and Maxwell dealer, are co-ordinating both dealers and manufacturers. It is possible that 120 men will be required and these men must be engineering experts with shop experience as foremen, as this is the work they will have to do in France.

SINGLE HEAD FOR WAR BUYING

Washington, Dec. 28—It is generally accepted that within a few weeks the President will have created a Ministry of Munitions which will correspond with a similar organization in England. Under this Ministry of Munitions there will be complete munitions, and such power will be centered in this new office. It is planned that the members of the present War Industries Board will be lieutenants, so to speak, to the Minister of Munitions, and that in all probability Daniel Willard, now chairman of the War Industries Board, will be given the position of Minister of Munitions.

So far as the motor car industry is concerned, this means that manufacture and purchasing of automotive apparatus for the war will be centered under this organization, and that instead of motor

A British official photograph of one of the tanks similar to those used in the great drive on Cambrai. Note the windows through which commander and driver watch

trucks, for example, being purchased and manufactured under the direction of the Signal Corps, the Engineers Corps, Medical Corps, the Ordnance Department, the Quartermaster's Department, or other departments, they will be centered under the Minister of Munitions. The abovementioned departments will thus cease to be purchasers of such apparatus and will be merely distributors of it to the different parts of the war zone where necessary. In other words, the activities of the different army departments thus become confined to operations in the war zone, and the industrial end of manufacture and purchase is separated from them and turned over to the Ministry of Munitions.

DETROIT HOLDS WAR SMOKER

Detroit, Dec. 28—Instead of the usual manufacturers' banquet, the Detroit section of the Society of Automotive Engineers this year held a war smoker, to conserve the food supply. About 400 members and guests were present and C. E. Frazer Clark, recently returned from France, told of his experiences while serving on the French front with the American Ambulance Field Service. Mr. Clark served eight months in the field, seeing action at Hill 304, Verdun, Dead Man's Hill and Argonne Fort. He explained in detail the caliber of the various French guns, their different ranges and why the guns were used in the various offensives. He emphasized the necessity of airplanes in carrying on an offensive and the importance of observation balloons. The next meeting of this society will be held in February. J. Edward Schipper, technical editor of Automotive Industries, is to be the speaker.

PEERLESS SHARE EARNS $10

Cleveland, Ohio, Dec. 28—New profits of the Peerless Truck & Motor Corp. for the ten months ending Oct. 31 amounted to $1,992,413, or $10 a share. This is after deducting all charges, including depreciation and interest. At this rate the annual profit will be $12 a share. Gross sales for the ten months were $17,013,113, and the surplus is $5,415,334.

Three New Studebaker Cars for 1918

Big and Light Six and Four-Cylinder Chassis with Full Body Line

THE Studebaker Corp. will bring out three new cars for 1918, a big six, 60 hp. chassis of 126-in. wheelbase; a light six 50 hp. chassis of 119 in. wheelbase; and a four 35-hp. chassis of 112-in. wheelbase. A seven-passenger touring body is mounted on the big six a five-passenger touring, a four-passenger and a two-passenger roadster on the light six and a five-passenger touring and a two-passenger roadster body on the four.

The new cars have full streamline bodies with a distinctive bevel edge. The seats are low-hung, being deep and comfortable; the windshield is of the slanting, rain-vision type, and a long robe and hand rail extends across the full width of the front seats. The auxiliary seats in the seven-passenger car fold into the back of the front seats and are inclosed by a leather drop curtain.

The engines are of the L-head type with the cylinders cast in block. The big six is 3⅞ by 5, developing 60 hp.; the light six, 3½ by 5, developing 50 hp.; and the four, 3½ by 5, developing 35 hp. The cylinder head is detachable in the big six and the cylinder blocks are cast integral in the light six and the four. All mainbearings are of die-cast bronze-backed babbitt. Crankshafts and camshafts are of chrome-nickel steel, drop forged and doubly heat-treated. A change in valve timing, together with an increase in lift from ¼ to $\frac{5}{16}$ in. and improved carburetion and manifolding, gives a material increase in power and smoother operation.

A hot-spot inlet manifold affords better fuel economy. The crankcase has been stiffened, which tends to reduce the vibration at high speeds. Lubrication is effected by a combined splash and distributing system in which the splash is reinforced by a gear oil pump in which the oil is supplied to the main and camshaft bearings.

The clutch is of the cone type, using an aluminum spider connected to the gearset by a Thermoid-Hardy coupling. The gearset is located amidships and is of the three-speed type with center control. The drive is transmitted through two Spicer joints to a semi-floating rear axle using spiral-bevel driving gears.

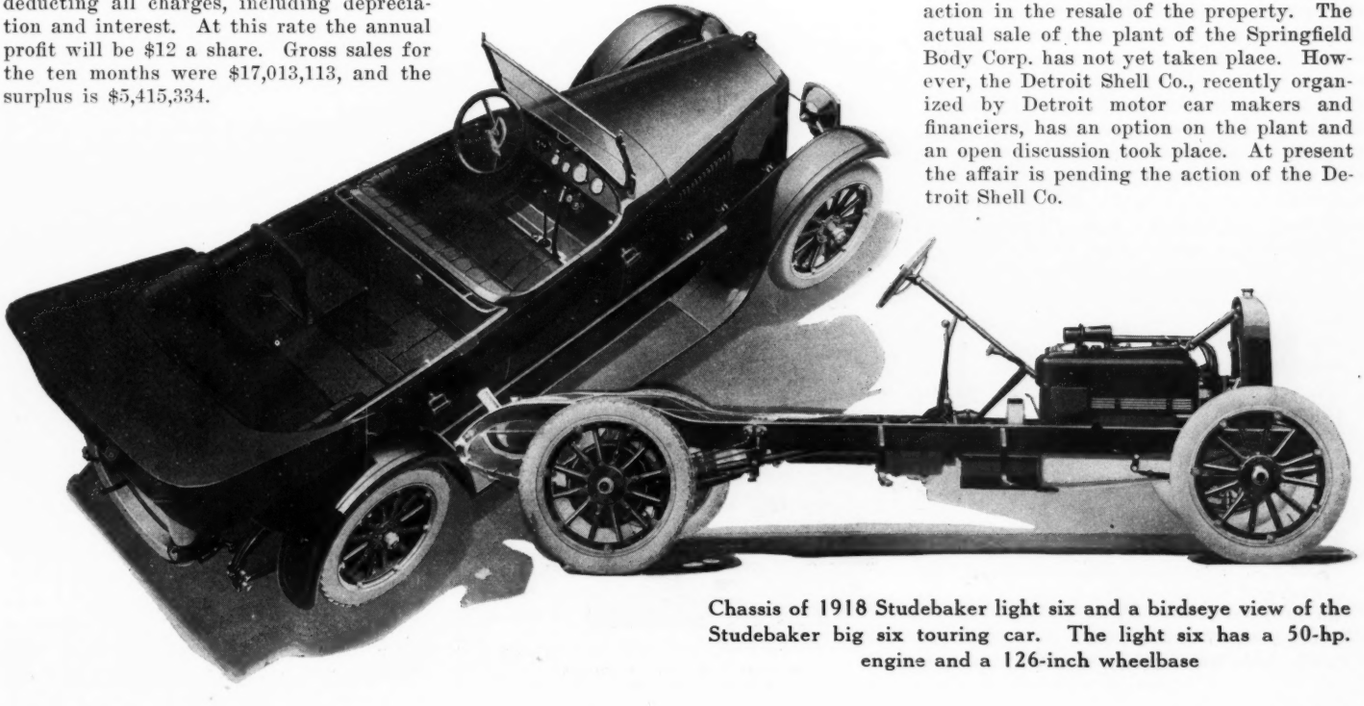
Hotchkiss drive is employed with the torque taken by semi-elliptic underslung rear springs, 56 in. long by 2 in. wide in the big six, and light six and 50¼ in. by 2 in. in the four.

The bottle-neck type of frame is used and is made from carbon steel. The frames vary in depth from 5½ in. for the big six to 4½ in. for the four and are made from stock $\frac{5}{32}$ in. thick. The frames are well braced with five cross members to provide ample strength.

The gear ratio on the big six is 3.7 to 1, on the light six 4 to 1 and 4.08 to 1 on the four. The tire sizes for the big six are 33 by 4½; light six, 32 by 4; and four, 32 by 3½. The equipment includes speedometer, oil gage, battery indicator, carbureter controls, gasoline gage, electric horn, complete set of tools and a robe and foot rail. The big and light sixes have mahogany instrument boards and mahogany panel with glove box on the back of the front seats. The big six is equipped with ammeter, Waltham clock and speedometer and tonneau lamp.

OPTION ON SPRINGFIELD BODY

Detroit, Dec. 28—A meeting of the Springfield Body Corp. and the Springfield Realty Co. was held to-day by the referee in bankruptcy to show a cause of action in the resale of the property. The actual sale of the plant of the Springfield Body Corp. has not yet taken place. However, the Detroit Shell Co., recently organized by Detroit motor car makers and financiers, has an option on the plant and an open discussion took place. At present the affair is pending the action of the Detroit Shell Co.

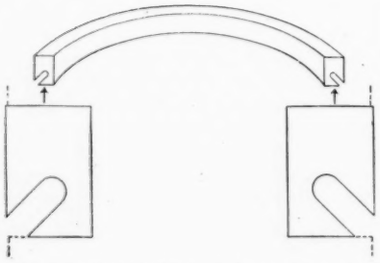


Chassis of 1918 Studebaker light six and a birdseye view of the Studebaker big six touring car. The light six has a 50-hp. engine and a 126-inch wheelbase

The Accessory Corner

Kliegl Electrical Connector

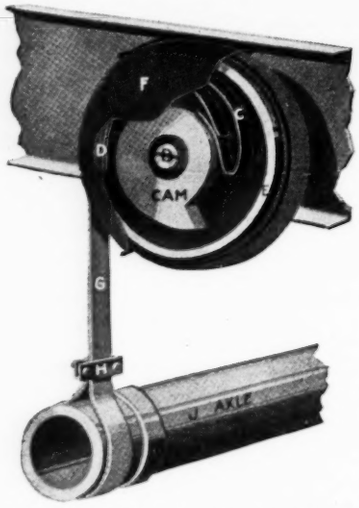
THE Kliegl electrical connector is a device for making rapid, frequent electrical connections and charging storage batteries in garages. The device is made of hard fiber with brass split pins that fit tightly and make good contacts. At each end is a cable clamp with teeth for biting into the cable to hold it firmly by its outer insulation, preventing any mechanical strain upon the connection. The two-wire connectors are made from 5 to 200 amp. and 125-250 volts and three-wire connectors from 5 to 100 amp. Kliegl Brothers, 240 West Fiftieth street, New York.



Cross-section of McQuay-Norris Superoyl ring, the lower illustration showing the oil reservoir

Patent Recoil Check

The Velvet Recoil Deadner is a device to check the up-throw on the front and rear of a car with cantilever springs and on other cars that violently rebound when they strike bad bumps or holes in the road. The device works positively and quickly and gradually deadens the shock on the recoil of the spring. The cam, A, is fastened on the pivot bolt, B, and the drum, E, revolves on the pivot bolt. The spring, C, is fastened to the inside of the drum and when the car goes up the drum revolves on pivot A and the spring travels up on cam A and begins the gradual stopping of the up-throw of the car. On the opposite side of the device another spring winds the drum up and the spring immediately slides down on the cam as the body of the car returns to normal.—John W. Blackledge Mfg. Co., 341 East Ohio street, Chicago.



Reference to the letters explain the Velvet Recoil Deadner

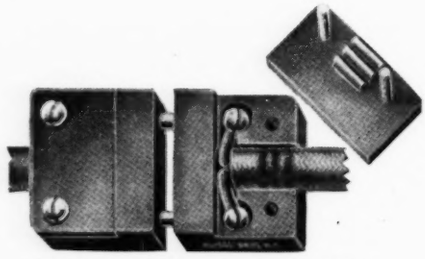
L-C Lighting Switch

A lighting switch of the push-and-pull type for gasoline or electric cars has been developed by the Industrial Controller Co., Milwaukee, Wis. No fiber parts are used in the construction, the insulated moving contact piece being Bakelite, into which the brass parts are molded. The switch is made with a round metal cylinder which permits round holes being drilled or bored in the dash. The cylinders are attached to a stamped steel plate which fastens to the outside face plate when the switch is installed. The inside plates are arranged to accommodate any number of switches, and when the switches are mounted in gangs the different units are held rigidly to a single plate. The handle is larger than usual, and the shaft carrying the moving contact extends clear through the switch and is supported at both ends, insuring proper alignments. Gangs of two or more switches are furnished to control ignition and different combinations of lights used on motor cars.

Syracuse Ford Lock

The new five-tumbler Syracuse Ford lock has several features. One is that when the car is locked the common contact strip through which the current must pass to get to the coils is grounded, which prevents a spark to the plugs by rewiring, installing separate battery or any other means except the key. The coil box is connected with the steering wheel column to form the ground by the ground plate which, after removing the nuts, is slipped over two of the bolts that help fasten the coil box and the column to the dash. When the nuts are again screwed on the bolts they force the turned-up portions of the grounding plate into the threads of the bolts, making a permanent ground between the coil box and the frame of the car. The common contact strip is grounded to the coil box only when the car is locked. In neutral the lock is fastened securely to the switch by a screw in the key guide hole of the regular switch. Installation takes only 5 min., it is said, and can be made on old or new Ford switches. Three keys come with a lock. Price, $2.50.—Syracuse Universal Mfg. Co., 304 West Fayette street, Syracuse, N. Y.

New five-tumbler Syracuse Ford lock, which is priced at $2.50



Kliegl electrical connector for charging storage batteries in garages

Stationary Tire Inflater

The new Brunner stationary tire inflater is designed for installation on a wall bracket in small public or private garages for pumping direct to the tire. The compressor has two cylinders 1⅝ in. in diameter and with 1½ in. stroke and will deliver 1¾ cu. ft. of air a minute and 125 lb. pressure. Lubrication is simple and effective. The outfit weighs 90 lb., is 20½ in. long, 15 in. wide and 12 in. high. The motor is geared to the compressor by a compressed cloth pinion gear, and the compressor is piped to the oil separator with a heavy copper pipe, making a compact and substantial unit. The compressor has three metal rings on each piston, and the motors used are ¼-hp. compound-wound direct current and repulsion-inducting type alternating current.—Brunner Mfg. Co., Utica, N. Y.

McQuay-Norris Superoyl

The McQuay-Norris Mfg. Co., maker of Leak-Proof piston rings, has brought out a new product, a special piston ring called the Superoyl, which is designed for the correction of oil troubles exclusively. It is for installation in the top groove of each piston and is a concentric ring with an oil reservoir cut into it at an angle of 45 deg. from the intersection of the cylinder wall and the lower groove bearing face of the ring, thus providing a scraping edge. While the oil is being scraped into the reservoir it cannot strike against the lower groove bearing of the ring, where it could creep into the groove and around the ring into the combustion chamber, it is claimed, because the lower edge of the reservoir terminates at a point slightly inside the piston's outer surface. The oil is kept constantly building up against the upper wall of the reservoir until the down stroke is completed, when it is emptied again over the lower rings.

Among the Makers and Dealers

BAILEY to Manage Templar Advertising—Charles T. Bailey has been appointed assistant sales and advertising manager of the Templar Motors Corp. Mr. Bailey was formerly with the Hal Motor Car Co.

Hall Gets Signal Corps Commission—C. M. Hall, founder of the Hall Lamp Co., and recently of the Wetzell Hall Co., has received a commission as major in the aviation section of the Signal Corps and will be stationed in Washington.

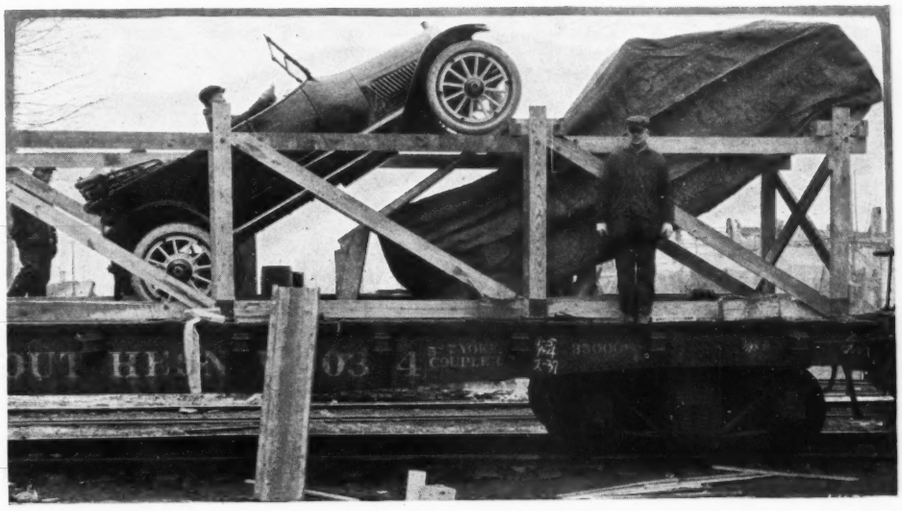
Dugan Joins U. S. Truck—W. E. Dugan has been appointed factory manager of the United States Motor Truck Co. He was formerly with the Selden Motor Truck Co., Rochester, N. Y., where he had charge of building its first class B Liberty truck.

Garford Manager at Capital Now—H. J. Adams, sales manager of the Garford Motor Truck Co., has been appointed an assistant to H. L. Horning in the Automotive Products Section of the Council of National Defense. Mr. Adams will be listed among the $1 a year men.

Avery Company Earns 29 Per Cent—The Avery Co. earned net profits of $771,000 during the eleven months ending Nov. 30, or 29 per cent on the $2,414,000 common stock, deducting the year's dividend on the preferred. The company's gross sales were larger than those of the corresponding period of 1916, but increased taxation left the net profits equal to those of 1916.

Three Resign from Saxon—Three resignations have taken place from the Saxon Motor Corp. recently. C. J. Elston, service manager, is now general sales representative of the Asbestos & Rubber Works of America; Ferris B. Frick, purchasing agent, is purchasing agent of the Chalmers Motor Co.; R. C. Getsinger, sales manager, has resigned, to take effect Jan. 1, and has announced no plans for the future.

Firestone Declares Extra Dividend—The Firestone Tire & Rubber Co. has declared an extra dividend of 25 cents a share, payable with the regular quarterly dividend of $1 to stockholders of record Dec. 10. This is the first increase in the dividend since 1916, when the value of the common stock was reduced to a nominal value of $10 per share and gave ten for one. A resolution was passed at the meeting stating that it is the desire to pay at least $1.25 per share each quarter in 1918 and that if nothing unforeseen occurs the disbursement on the common will total 6 per cent. This will be paid either in equal regular quarterly installments or by regular installments plus extra distribution at the option of the board. This action is expressive of the outlook of the board on good business prospects for the coming year.



CONSERVING RAILROAD EQUIPMENT—Here is how two Oldsmobiles are loaded where one was loaded before. The car is driven on by its own power and rests at an angle of 33 deg. on the heavy frame work built for that purpose

Four Parts Concerns Merge—The Bowen Mfg. Co., Auburn, N. Y.; Zerk Mfg. Co., Cleveland; Wiskley Co., Detroit, and the Canadian Wiskley Co., Windsor, Ont., have been consolidated and will be styled Bowen Products Corp., Auburn. The combined capital will be $2,500,000. The merged plants manufacture parts, but at present are engaged chiefly on motor truck work for the Government.

Trucks Coming from Sioux City—The Hawkeye Truck Co. has been formed at Sioux City, Iowa, with $300,000 capital to take over the business of the Hawkeye Mfg. Co. The company will manufacture trucks. Officers and stockholders in the company are: President, R. W. Bennett; vice-president, F. W. Kemp; treasurer, A. T. Bennett; secretary, L. D. Baggs.

Goodrich Makes Branch Changes—F. J. Redeman has been transferred from the Hartford branch of the Goodrich Tire & Rubber Co. to the New England district of the manufacturers' sales department. E. J. Smith, formerly manager of the Providence branch, will succeed Mr. Redeman at Hartford, while O. C. Pahline, formerly salesman in Providence, has been appointed Providence manager.

Duplex Truck Profits Are $92,002—Net profits of the Duplex Truck Co. since Nov. 23, 1916, when the company was organized, are $92,002.10. The company has discontinued operations at its Charlotte plant and is moving the balance of its stock and material to Lansing.

Motor Products Buys Windshield Department—The Motor Products Corp. has purchased the windshield department of the Page Steel & Wire Co. and plans to make the actual exchange of property early in the year, when the equipment will be moved to Detroit. The Page Steel & Wire Co. has been manufacturing windshields for the last six years, quite extensively for the last three.

Peterson Now with King—J. W. Peterson has been made factory manager of the King Motor Car Co. He was formerly with Peerless, Hupp-Yeats and Nelson. Recent statements published throughout the country that government orders on armed cars, ambulances, etc., being filled by the King Co. have stopped passenger car production are untrue. Orders now on hand, however, prevent delivery on any subsequent order until late spring.

Coming Motor Events

MEETINGS

Jan.	7-8—New York, National Automobile Dealers' Association, board of directors and eastern vice-presidents' beeting.
Jan.	8—New York, N. A. C. C., meeting of motor truck makers.
Jan.	10—New York, S. A. E., Automotive dinner at Hotel Biltmore.
Jan.	11-16—New York, National Association of Automobile Accessory Jobbers' convention.
Feb.	1—Chicago, S. A. E., War dinner at Hotel Horrison.

SHOWS

Jan.	5-12—New York.
Jan.	9-27—Cleveland, Ohio.
Jan.	11-18—Washington, D. C.
Jan.	11-19—Providence, R. I.
Jan.	14-19—Rochester, N. Y.
Jan.	16-25—Milwaukee, Wis.
Jan.	19-26—Montreal, Canada.
Jan.	19-26—Detroit.
Jan.	19-27—Cleveland, Ohio.
Jan.	21-26—Scranton, Pa.
Jan.	21-26—York, Pa.
Jan.	21-26—Portland, Ore.
Jan.	21-28—Wilmington, Del.
Jan.	22-25—Oklahoma City, Okla.
Jan.	22-26—Baltimore, Md.
Jan.	26-Feb. 2—Chicago.
Jan.	26-Feb. 2—Harrisburg, Pa.
Jan.	26-Feb. 2—Columbus, Ohio.
Feb.	2-9—Minneapolis, Minn.
Feb.	5-9—Binghamton, N. Y.
Feb.	9-16—Kansas City, Mo.
Feb.	11-16—Kansas City, Mo.
Feb.	11-16—St. Louis, Mo.
Feb.	11-17—Toledo, Ohio.
Feb.	16-24—San Francisco, Cal.
Feb.	18-23—Syracuse, N. Y.
Feb.	18-23—Grand Rapids, Mich.
Feb.	18-23—Springfield, Ohio.
Feb.	18-23—Des Moines, Iowa.
Feb.	18-23—Duluth, Minn.
Feb.	18-25—Pittsfield, Mass.
Feb.	18-27—South Bethlehem, Pa.
Feb.	20-23—Quincy, Ill.
Feb.	20-23—Des Moines, Iowa.
Feb.	22-March 2—Salt Lake City, Utah.
Feb.	25-March 2—Muskegon, Mich.
Feb.	26-March 3—Omaha, Neb.
March	2-9—Boston, Mass.
March	6-9—Clinton, Iowa.
March	6-9—Sioux Falls, S. D.
March	16-20—Great Falls, Mont.
March	20-23—Trenton, N. J.
April	9-13—Stockton, Cal.

From the Four Winds

IOWA Registers 280,000 Cars—Car owners paid $2,280,000 into the state treasury of Iowa during 1917 for fees. In the motor vehicle department of the secretary of state's office 280,000 cars were registered.

Registrations in Montana Pick Up—Nearly twice as many motor vehicles were registered in Montana this year as last. In 1916 25,549 motor vehicles were registered and last year 52,696. The total receipts of the registration department this year were $295,-207.70 and the expenses $27,750.10, leaving a net income of $267,457.55.

Wisconsin to Teach Motor Courses—To help Wisconsin help to win the war the agricultural engineering department of the University of Wisconsin has arranged a short winter course in gasoline engines, tractors and farm trucks, beginning Jan. 14 and ending February 9. Fifty will be admitted to the first course, which may be repeated later.

Texas Highway Law Involved—Governor William P. Hobby of Texas has appointed Judge T. S. Johnson of Austin as special judge to sit in the case of P. S. Atkins vs. The State Highway Commission. This is a case to test the constitutionality of the new highway and motor car law. Should a judgment be rendered in favor of Atkins, Texas will be compelled to have a new motor law.

Farmers Gather to Study Tractor—One hundred and fifty farmers gathered at St. Louis recently to learn more about running tractors. About 10 per cent were prospective tractor owners, the others owning machines. The school was held at the J. I. Case T. M. Co. Two sessions were held daily and a stripped Case 9-18 tractor was used for laboratory purposes. One farmer traveled more than 400 miles to attend.

Dealer Gives Draft Service—A dealer in Winnipeg, Man., the Multi-Power Motor Sales, Ltd., is announcing its willingness to sell cars belonging to those drafted without commission. So far it is the only Canadian company that has offered this service. The object is to enable drafted men to leave additional money with dependents and to realize on their cars, which would be useless to them while in service perhaps.

Minnesota to Sell Old Tags—Owners and dealers have been asked to save the 1915-1917 Minnesota license tags for the aluminum that is in them. Offer has been made by a manufacturer to buy them and the secretary of state, who issues the tags, estimates $10,-000 and more may be added to the Red Cross fund by this sale. Central points have been named to receive these old tags and from distant points owners are asked to send their old tags in by mail. In Minnesota tags are issued for three years at a time at the net rate of $5.

Ohio Wants Its Roads Marked—Cast-iron posts with enameled signs soon will be located on every cross road in Ohio, if the members of the board of administration has its way. The designs for the guide posts have been approved and with the installation of the equipment for making 1919 license tags the state prisoners will be able to turn out thousands of sets of name plates daily. County commissioners will be asked to have surveyors compile a list of all the signs needed to properly mark every public highway in the country. One of the first things attempted will be to place these signs along the Dixie, Lincoln and National highways, and after that on every improved and unimproved road in the state, designating by color or design the best route to travel to reach a certain point.

THIS COLE LIVED TO TELL THE TALE—Mexican bandits and Indians figured in this car's past. It belonged to one of Villa's staff and took part in Mexican raids. As the property of an El Paso man it crossed the Gila with Indians as pilots—at $5 a trip. But then another car paid $25 to cross later

Blue Sundays in Texas—In many Texas counties car owners no longer can buy gasoline and oils on Sunday. Prosecutors of the different counties contend this to be a violation of the law under the Blue Sunday laws of the state. Thus far the question has not been carried to the higher court, but it is said it will be within the next few weeks. In Grayson county there are more than 6000 owners and the Sunday sale of gas and oils has been prohibited.

All States Take Federal Aid—That all the states have availed themselves of the Federal Aid Road Act, which appropriated $75,000,-000 for the construction of post roads and $10,000,000 for forest roads, is shown in the report of the director of the office of public roads and rural engineering, Department of Agriculture. In 1916 approximately $41,000,-000 of state funds was expended for all highway purposes; it is estimated that in 1917 the aggregate expenditures of state funds for roads was at least $60,000,000. Several states have made appropriations to meet Federal Aid dollar for dollar. Among these are New York, Illinois, Michigan, Rhode Island, Nevada, Iowa, Florida and Vermont.

Des Moines Plans Two Shows—Plans are now well organized for the ninth annual motor car show of the Des Moines Automobile Dealers' Association which will be held Feb. 18-23. All signs point to the most successful show yet held at Des Moines. A well developed, husky younger brother of the motor car show will be the second annual motor truck show, which will be held on the same dates four blocks from the motor car shows. The two shows are being handled individually, but promoters of both are working together. The Des Moines Motor Truck Association has been formed to handle the truck show. Harter Hull, sales manager for the Kratzer Carriage Co., is president; William Gibson, of Consigny Truck Co., vice-president; and George E. Hamilton, associated secretary of the Chamber of Commerce, secretary.

Minneapolis Changes Non-Parking Space—Privately marked non-parking zones in Minneapolis, Minn., are to be eliminated by a new ordinance effective Feb. 1, 1918. Non-parking zones will be established in the main business section. These zones are in the middle of each block, varying in length from 50 to 80 ft., according to the length of the block, 30 ft. each side of fire hydrants, and alley entrances are in the non-parking zone. The non-parking hours are set at from 10 a. m. to 6:30 p. m.

How Goodyear Gets Materials—Some impression as to the difficulties in obtaining raw materials may be gained from the knowledge that the Goodyear Tire & Rubber Co. for more than a year has maintained a crew of fourteen men who ride over the country, spotting cars of materials and bringing them to Akron, Ohio. One of the most important materials in the manufacture of tires is cotton. The foundation is built up by placing layer on layer of cotton. During the fiscal year just ended Goodyear used 42,000,000 yd. of cotton fabrics.

Texas to Organize State Association—The Texas State Automobile Club Association will be formed at Dallas Jan. 15 under the auspices of the Dallas Automobile Club. It is expected that representatives from more than fifty clubs will be present and more than 200 representatives are expected. The primary objects will be to promote better road movements, oppose discriminatory and unjust legislation and to work out some plan whereby thefts may be prevented. The new association will not interfere but will be in cooperation with that of the Texas Automobile and Accessory Dealers' Association, which was organized here last spring.